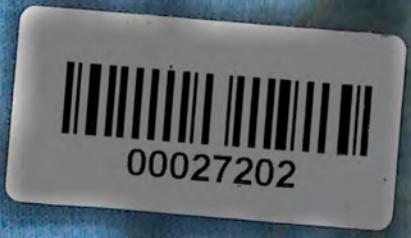
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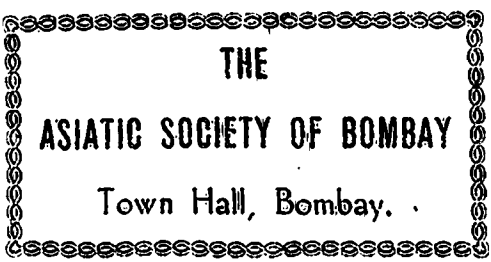

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PREFACE BY THE TRANSLATOR.

It is observed by a popular French writer, Bernardin de St. Pierre, that by far the most valuable and entertaining part of modern literature is the department filled up by travellers. While the knowledge of the ancients extended merely to a small circle around them, and even there was far from accurate, there is hardly a nook in the most remote corner of the world of which we do not now possess some description, and with the inhabitants of which we are not more or less acquainted. We see the human race before us in every stage of civilization, from the refinement and enterprize of the inhabitants of the west of Europe, down to the

stupid savage of New Holland or the Terra del Fuego.

The eagerness with which the public have always received the accounts of travellers has naturally contributed to their multiplication. It is to be regretted, however, that this eagerness is too frequently so indiscriminate that almost nothing is so very insipid that it will not be devoured in the shape of travels. Hence the numerous productions which have appeared of late without adding any thing to our stock of information. No individual now who has left the bounds of our own island, hesitates a moment about the qualifications necessary for his appearance before the public at his return. His previous education, his means of access to proper sources of information, and his leisure to acquire it, are objects of inferior concern. He has travelled, and that is enough.

M. de Humboldt belongs to a higher order

of travellers, to whom the public have of late been very little accustomed. We must place him beside a Nieubuhr, a Pallas, a Bruce, a Chardin, a Barrow, and a Volney; and his works will probably be long consulted as authorities respecting the countries which he describes. He seems to be a stranger to few departments of learning or science; and his fortune enabled him to provide himself with every thing which could most advance his pursuits, and to make that appearance among persons of rank and authority necessary to remove the obstacles in the way of a traveller in every country, but most of all in a country under an arbitrary government.

The work of which a translation is here offered to the public was submitted to a very severe trial: the sketch of it was freely communicated to the natives of New Spain, and underwent the examination of the Spanish government. It may be doubted,

however, whether the accuracy and fulness of information which such a measure has a tendency to procure might not be counterbalanced by seemingly unavoidable disadvantages. We never talk of our friends so candidly before their faces as behind their backs. In the former case we may say nothing but the truth, but we are seldom disposed to say the whole truth. He must be a very honest traveller indeed who communicates all the remarks which occur to him to the people among whom he is travelling. Even Dr. Johnson, with all his bluntness, would have hesitated to read his Tour to the Hebrides to his Scotch landlords.

There is one disadvantage indeed almost inseparable from the mode in which M. de Humboldt appears to have been treated in the new world. He received so much attention both from public men and private individuals during his stay in Mexico, that

he could hardly avoid displaying some portion of gratitude in return. We accordingly find him exceedingly prone to give favourable accounts of all the individuals of that country whom he has occasion to mention. He is profuse in his compliments to their learning, science, and their other good qualities, and nothing ever appears to shade the picture. We may easily conceive, therefore, that he must have seen both in individuals and institutions much more that met with his disapprobation than he has chosen to communicate.

M. de Humboldt has brought forward a great mass of information regarding New Spain, a country of which we before knew very little indeed. Let the specious paragraphs of our celebrated countryman Robertson be attentively weighed, and we shall be astonished to find how little specific information they sometimes really contain. The present work, however, furnishes us

with precise data on a very great variety of important subjects. Yet it is to be regretted that the author could not throw occasionally more rapidity into his descriptions, and give somewhat more condensation to his materials. He is sometimes rather apt to indulge in repetition, and to swell his accounts with circumstances by no means essential to be told, but which have a necessary tendency to fatigue the attention of the reader. This failing is not peculiar to M. de Humboldt, but is common to him with too many authors, and particularly those of his own country, Germany. Indeed the faculty of selecting the more important and leading features of an object is, perhaps, the rarest and most valuable which any writer can possess. It is this which communicates such a charm to the history of Hume, and arrests so strongly our attention in the travels of Volney.

But whatever may be the sentiments of

the translator on this subject, it is not for him to endeavour to alter his original to what he conceives a model of perfection. The public naturally wish to have his information in his own manner, and as nearly in his own terms as possible. It were well if even this was tolerably done; but the rapidity with which translations like the present must necessarily be executed will not admit of that flow and correctness of style which the leisure of the closet might produce. When we sit down to the translation of an established classic, we may patiently endeavour to transfuse the beauties and graces of the original into our own language; but the translation of a work like this, impatiently expected by the public, must lay claim to a very inferior degree of merit.

A few notes have been occasionally thrown in by the translator, which he has not the vanity to suppose of any great im-

portance; but as they do not in general occupy much room, and as they served to amuse him in the course of the work, he hopes if they do not meet with the reader's approbation, they will, at least, meet with his indulgence. In one of them, vol. i. p. 47. he observes that he has completely misunderstood the author, a circumstance certainly not the more justifiable, because it is by no means unusual with commentators.

The translator has been at some pains in ascertaining the value of the different foreign measures, weights, and monies, used by the author, and converting them into those of our own country. The omission of this is but too frequent in translations, though it is essential to any work which aims at being generally understood. These conversions, however, appear only in the notes, the original having undergone no alteration.

The orthography of the names has been preserved in the translation with few exceptions. The Spanish names of persons and places have never been touched, but in a few names of Indian nations, such as *Azteques*, *Tolteques*, &c. the *ques* has been converted into *cs*, the corresponding termination in our own language. Clavigero uses the same freedom in the Italian, writing these words *Aztecchi*, *Toltecchi*, &c. This liberty is perhaps justifiable, though it might not be advisable to go all the length recommended by Volney, in whose work on North America we can with difficulty recognize the names most familiar to us. Who, for instance, could find out *Washington* in *Ouachinnetone?* The various sounds given to the same letters by the different European nations occasion a good deal of perplexity. The same name assumes quite a distinct appearance in the works of a French and an English travel-

ler. Another source of perplexity peculiar to the Spaniards and Germans is the indiscriminate use of certain letters. The Spaniard, for example, confounds the *b* and the *v*; the *ç* and the *z*; the *j*, the *g*, and the *x*; and they write the same word sometimes with one of these letters and sometimes with another. It is necessary to give this caution to the reader, who, were he to meet with *Xuan de Grixalba* in one place, and *Juan de Grijalva* in another, might not at first perceive the identity. M. Pinkerton, who seems to plume himself not a little on his orthography, observes, that the Spanish, French, and Italian writers, write Motezuma; the English alone Montezuma; and he of course must follow the Spanish, French, and Italian writers. Why the English are bound to follow the orthography of these nations it is not so easy to conceive, any more than that they should follow the English, the proper orthography

being neither Motezuma nor Montezuma, but Moteuczoma. M. de Humboldt sometimes inserts the *n* and sometimes leaves it out.

A considerable part of the Essay on New Spain has not yet arrived in this country; but, when it does arrive, no time will be lost in communicating it to the public, if the portion now presented shall meet with a favourable reception. The most important of the maps and drawings in the part which we have received appear in the present publication, but on a more economical scale. Of the maps and physical sections it is sufficient to say, that they have been executed under the care of Mr. Lowry, whose well known taste and skill so justly entitle him to the public confidence. It would have been foolish to attempt to imitate the magnificence of the original; but it will be found that nothing of essential importance has been omitted. The

publishers wished to spare no necessary expense in the present publication; but they were averse from increasing the price of a book intended for general circulation by an ostentatious and injudicious splendour.

TO

HIS CATHOLIC MAJESTY

CHARLES IV.

KING OF SPAIN AND THE INDIES.

SIRE,

HAVING enjoyed in the distant regions subject to your sceptre the protection and kind offices of your Majesty during a long succession of years, I fulfil only a sacred duty in laying at the foot of your throne the homage of my profound and respectful gratitude.

I had the good fortune to be introduced to your Majesty in 1779 at Aranjuez. You deigned to applaud the zeal of a private individual, whom the love of science conducted to the banks of the Orinoco and the summits of the Andes.

It is through the confidence which your Majesty's favours have inspired in me that I venture to place your august name at the head of this work. It contains the description of a vast kingdom, the prosperity of which is dear to your heart.

None of the monarchs who have occupied the Castilian throne have contributed more liberally than your Majesty to the obtaining accurate information regarding the state of that valuable portion of the globe, which in both hemispheres yields obedience to the Spanish laws. The coasts of America have been surveyed by able astronomers with a munificence worthy of so great a sovereign. Accurate maps of these coasts, and even minute plans of several military positions, have been published at the expense of your Majesty; and you gave orders that there should be annually published in a Peruvian journal at Lima a state of the commerce, finances, and population.

There was still wanting a statistical essay on the kingdom of New Spain. I digested

the great number of materials which I possessed into a work, of which the first sketch drew the attention of the viceroy of Mexico in a manner which redounded to his honour. I should be happy if I could flatter myself that my feeble efforts, under a new form, and more carefully digested, are not unworthy of being presented to your Majesty.

They breathe the sentiments of gratitude which I owe to the government who protected me, and to the noble and loyal nation who received me, not as a traveller, but as a fellow-citizen. How can we displease a good king, when we speak to him of the national interest, of the improvement of social institutions, and the eternal principles on which the prosperity of nations is founded?

I am, with the greatest respect,
SIRE,
your Catholic Majesty's very humble
and very obedient servant,
THE BARON DE HUMBOLDT.

Paris, 8th March, 1808.

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GEOGRAPHICAL INTRODUCTION.

In publishing maps of New Spain, differing in many respects from any which have hitherto been published, it is incumbent on me to give some account to astronomers and naturalists of the materials which I have employed. When an author makes nothing more than a compilation; when he draws from sources not generally known, and merely collects what is scattered in printed works or engraved maps, a simple nomenclature of the articles employed may serve for analysis. It is otherwise when a map is founded on the astronomical observations or measurements of an author himself; when he has had recourse to plans and manuscript notes preserved in archives or buried in convents. In the latter case, which is mine, the geographer has a right to demand a satisfactory exposition of the means employed for verifying the position of the most important points. In offering this exposition to the public, I shall carefully distinguish the results of simple combinations, from what has been immediately deduced

from astronomical observations, and geodaæsical or barometrical measurements made on the spot. I shall endeavour to give a succinct analysis of the materials which I had at command, reserving, however, the purely astronomical details for the collection of observations and measurements which I publish conjointly with M. Oltmanns. In following this course, the different parts of my work, the statistical account of Mexico, the historical relation of my journey in the tropics, and the astronomical volume, will all serve, I flatter myself, to prove that a desire of accuracy and the love of truth have been my guides during the course of my expedition. May my feeble labours contribute something to dispel the darkness which for so many ages has covered the geography of one of the finest regions of the earth!

I. REDUCED MAP OF THE KINGDOM OF NEW SPAIN.

I DREW up this map at the Royal School of Mining (*Real Seminario de Mineria*) in the year 1803, a short time after my departure from the city of Mexico. M. d'Elhuyar, director of this school, had long been collecting facts regarding the position of the mines of New Spain, and the thirty-seven districts into which they are divided, under the denomination of *Deputaciones de Minas*. He was

desirous of having a detailed map, on which the most interesting mines were marked, constructed for the use of the supreme college, called *Tribunal de Mineria*. A labour of this nature was in fact very necessary, both for the administration of the country, and for those who wish to know its national industry. In vain do we seek in the greater number of maps published in Europe for the name of the city of Guanaxuato, which contains 70,000 inhabitants; or for that of the celebrated mines of Bolaños, Sombrerete, Batopilas, and Zimapan. None of the maps which have hitherto appeared show the position of the *Real de Catorce* in the intendancy of *San Luis Potosi*, a mine from which there is annually drawn nearly 20 millions of francs* of silver; and which, from its proximity to the *Rio del Norte*, appears already to have tempted the cupidity of several colonists recently established in Louisiana. Having begun to calculate the greater number of my astronomical observations, that I might have some fixed points on which others could be established, and having at my disposal a considerable number of materials and manuscript maps, I conceived the idea of extending the plan which I had at first formed. Instead of merely inserting in my map the names of three hundred places known for considerable mining undertakings, I proposed to unite together all the

* 838,400*l.* sterling. *Trans.*

materials which I could procure, and to discuss the differences of position which these heterogeneous materials every instant presented. We ought not to be surprised at the uncertainty which prevails in the geography of Mexico, when we consider the fetters which have arrested the progress of civilization, not only in the colonies, but also in the mother country; and especially when we consider the long peace enjoyed by these countries since the commencement of the sixteenth century. In Hindostan, the wars with Hyder Ally and Tippoo Sultan, the continual marches of armies, and the necessity of seeking the shortest communication, have singularly contributed to augment geographical information. And yet an accurate acquaintance with Hindostan, a country visited by the most active nations of Europe, does not extend farther back than thirty or forty years. I ought to have foreseen, that, notwithstanding the most assiduous labour during three or four months, I could only give a very imperfect map of Mexico, compared with the maps of the most civilized countries of Europe. This idea, however, did not discourage me. When I considered the advantages afforded me by my individual situation, I had to flatter myself that my work, notwithstanding the important faults which might disfigure it, would still be preferable to what has yet been offered to the public on the geography of New Spain.

It will be said, without doubt, that it is yet too soon to draw up general maps of a vast kingdom for which exact data are wanting. But, for the same reason we should, with the exception of the province of Quito and the United States, publish no map of the interior of continental America. For the same reason, also, we should not yet construct maps of many parts of Europe, of Spain for example, or Poland, countries in which, on surfaces of more than 1600 square leagues, there is not to be found a single place whose position has been fixed by astronomical means. It is not yet fifteen years since, in the centre of Germany there were hardly twenty places the longitude of which was determined with certainty to within a sixth or an eighth part of a degree.

In the part of New Spain situated to the north of the parallel of 24°, in the provinces called *Internas* (in New Mexico, in the government of Cohahuila, and in the intendancy of New Biscay) the geographer is reduced to form combinations from the journals of routes. The sea being at a great distance from the most inhabited part of these countries, he has no means to connect together places situated in the interior of a vast continent, with points on the coast a little better known. Hence, beyond the city of Durango, we wander as it were in a desert, notwithstanding the show of manuscript maps. There are not more resources to be found than Major Rennel possessed for draw-

ing up maps of the interior of Africa. It is otherwise in the part of Mexico contained between the ports of Acapulco and Vera Cruz, and between the capital of Mexico and the Real* of Guanaxuato. In this region, traversed by me from the month of March, 1803, to the month of February, 1804, a region the most cultivated and best inhabited of the kingdom, there are to be found a sufficient number of points of which the position is astronomically determined. It is to be wished that a traveller, versed in the practice of observations, and provided with a sextant, or a small repeating circle of reflection, a chronometer, an achromatic telescope and a portable barometer for measuring the height of mountains, should travel in three directions over the north of the kingdom of New Spain. He should direct his course, 1st. from the city of Guanaxuato to the *presidio* of *Santa Fe*, or to the village of Taos in New Mexico; 2d. from the mouth of the Rio del Norte, which pours its waters into the gulph of Mexico, to the sea of Cortez, particularly to the junction of the Rio Colorado and the Rio Gila; and, 3d. from the city of Mazatlan, in the province of Cinaloa, to the city of Alta Mira, on the left bank of the Rio de Panuco.

The first of these three journies would be the most important, the easiest to execute, and that in

* The word *Real* indicates a place where mines are worked.

which the chronometer would be exposed to the smallest changes of temperature. It would be useful, however, not to rely altogether on the mere lapse of time, but to employ for determining the longitudes, the satellites of Jupiter, eclipses, and especially the distances from the moon to the sun, means which since the publication of the excellent tables of Delambre, Zach, and Bürg, merit the highest degree of confidence. In the astronomical journey from Mexico to Taos, the position would be verified which I have assigned to St. Juan del Rio, to Queretaro, Zelaya, Salamanca, and Guanaxuato; the longitudes and latitudes would be determined of S. Luis Potosi, Charcas, Lacatecas, Fresnillo and Sombrerete, five places celebrated for the riches of their mines; and the passage would lie through the city of Durango and the Parral at Chihuahua, the residence of the governor of the *Provincias Internas*. In following the Rio Bravo, the traveller would pass along by the Passo del Norte, to the capital of New Mexico, and from thence to the village of Taos, the most northern point of this province.

The second journey, the most severe of all, and in which the observer is exposed to a burning climate, would supply fixed points in the new kingdom of Leon, in the province of Cohahuila, in New Biscay, and in Sonora. The operations should be directed from the mouth of the Rio Bravo del Norte, through the episcopal seat of

Monterey, to the presidio of Moncloya. Pursuing the route by which the Chevalier de Croix, viceroy of Mexico, arrived in 1778, in the province of Texas, he would reach Chihuahua to connect the second journey with the first; from Chihuahua he would pass by the military establishment (presidio) of S. Buena Ventura, to the city of Arispe, and from thence, either by the presidio of Tubac, or by the missions of the Primeria alta, or across the savannahs inhabited by the Apaches tontos Indians, to the mouth of the Rio Gila.

The third excursion, in which he would traverse the kingdom from Alta Mira to the port of Mazatlan, would be connected with the first by the city of Sombrerete; it would serve, by a winding to the north, to fix the position of the famous mines of Catorce, of Guarisamey, Rosario and Copala. A few days would suffice to determine the latitude and longitude of every place we have named. Only the most considerable cities, such as Zacatecas, S. Luis Potosi, Monterey, Durango, Chihuahua, Arispe, and Santa Fe of New Mexico, would occasion a stay of a few weeks. The astronomical means here indicated easily afford, although the observer should not possess a very extraordinary ability, a certainty of 20 seconds* for the latitude, and of a third of a minute

* One of our most celebrated astronomers observes with truth, that even at this day, since the introduction of repeating

in time for the absolute longitude. How many considerable cities are there in Spain, and in the most eastern and northern parts of Europe, which are still far from this accuracy of geographical position!

The very trifling expense of the execution of these three journies, above all of the first, would give a new face to the geography of New Spain. The positions of Acapulco, of Vera Cruz and Mexico, have been repeatedly verified by the operations of Galiano, of Espinosa and Cevallos, of Gama and Ferrer, and by my own. The officers of the royal marines stationed at the port of San Blas, could in a single excursion fix the important positions of the mines of Bolaños and of the city of Guadalaxara. The astronomical expedition

circles, there are not three places of the earth the latitude of which is known *with* the *certainty of a second*. In 1770, the latitude of Dresden was nearly three minutes false: that of the observatory of Berlin was uncertain till 1806, for nearly 25 seconds. In 1790 before the observations of Messrs. Barry and Henry, the position of the observatory of Manheim was false by a minute and 21 seconds of latitude, and yet father Christian Mayer had observed with a quadrant of Bird of 8 feet radius. (*Ephemerides de Berlin*, 1784, p. 158, and 1795, p. 96.) Before the observations of Le Monnier, we were ignorant of the true latitude of Paris for nearly 15 seconds. The astronomical journal of M. de Zach offers examples which serve to prove that an exercised observer, provided with a good sextant and an exact artificial horizon, may find the true latitude of a place to within seven or eight seconds.

which the government has entrusted to MM. de Cevallos and Herera, for surveying the coast of the gulph of Mexico, will determine the mouth of the Rio Huasacualco to the south-east of Vera Cruz. It would be easy for these able astronomers, who are provided with superb English instruments, to ascend this river, to which the project of a canal of communication between the Atlantic and South seas has given such celebrity; they would determine the breadth of this Mexican isthmus, in fixing the position of the port of Tehuantepec and of the bar of S. Francisco at the mouth of the Rio Chimalapa.

The means which I propose in this memoir could be easily carried into execution at a small expense. There does not exist on the globe a country affording greater advantages for trigonometrical operations. The great valley of Mexico, the vast plains of Zelaya and Salamanca, level as the surface of the waters which appear to have covered their soil for a long succession of ages; these plains, elevated 1700 metres* above the level of the ocean, and bounded by mountains visible at great distances, invite the astronomer to the measurement of several degrees of latitude towards the northern limits of the torrid zone. In the intendancy of Durango, in a part of that of S. Luis Potosi, triangles of an extraordinary extent might be traced over a surface covered with

* About 5670 feet. *Trans.*

grasses, and bare of wood; but to undertake the trigonometrical survey of the kingdom of New Spain, to wish to extend delicate operations over a surface five times larger than France, is to prevent the government from ever possessing a general map of its rich dominions, and to engage the court of Spain in a brilliant undertaking, but an undertaking of too great extent to be ever carried into complete execution. The scrupulous accuracy with which the officers of the Spanish marine examined the smallest sinuosities of the coast of South America has been censured*. This work was undoubtedly both laborious and expensive; it appears to me, however, that it is unreasonable to blame those who presented to his catholic majesty so admirable a project of hydrographical survey. A marine chart can never be too minute. The safety of navigation, the facility of recognizing landing places, the necessary means of defence against an enemy who threatens disembarkation, all depend on the most intimate acquaintance with the coast and with the bottom of the sea. In the interior of a country it is sometimes of little consequence that the position of a city be exactly laid down to a minute of latitude; but on the coast, it is of the

* One of the most learned geographers of the age, Major Rennel, observes that the English possess very exact charts of the anchorages on the coast of Bengal, while there does not exist any thing like a tolerable chart of the English channel. (*Description of Hindostan*, vol. 1, *Preface.*)

utmost importance to know the position of a cape, with all the accuracy which astronomical means admit of. In a hydrographical chart all the points should be equally well determined; for every one of them may serve as a point of departure or observation; and there is none which is not connected with others; while, on the contrary, the maps which represent the interior of a country possess great merit, when they offer a certain number of places whose position has been astronomically fixed.

If it is desirable that the Spanish possessions in the interior of America should not be for some time surveyed with the same minute accuracy which has been displayed on the coast; if in the actual state of things it would be more useful merely to execute a provisory undertaking, founded on the use of sextants and chronometers, on lunar distances, on observations of satellites, and on currents, it would be of no less importance to unite these purely astronomical means such other means as are furnished by the nature of the country and the great elevation of its insulated summits. When we know exactly the absolute height of these summits, whether by means of the barometer, or by geometrical operations, angles of altitudes and azimuths taken with the rising or setting sun may serve to connect these mountains with points whose latitude and longitude have been sufficiently verified. This method

furnishes perpendicular bases; and in estimating how much we may be deceived in the measurement of each base, it is easy to conclude by false suppositions what influence this error may have on the astronomical position either of the mountain itself, or of the other points which depend on it. An exact knowledge of the inferior limit of perpetual snow will often afford the same advantages as the measurement of an insulated summit. This is the method employed by me to verify the difference of longitude between the capital of Mexico and the port of Vera Cruz. Two great volcanos, that of la Puebla, called Popocatepetl, and the peak of Orizava, both visible from the platform of the ancient pyramid of Cholula, serve to connect two places distant from one another more than 16,000* toises. The union of two geometrical measurements of the mountains, of the azimuths and angles of altitudes calculated by M. Oltmanns, have given the port of Vera Cruz $0^h\ 11'\ 32''$ to the west of Mexico, while from purely astronomic observations there results a difference of me dians of $0^h\ 11'\ 47''$. In modifying the for result by several secondary operations at th ramid of Cholula, we find even $0^h\ 11'\ 4$ so that in this particular case, on a dist three degrees, the method of azimuths $7''$ false in time†.

* About 102,400 feet English. *Trans.*

† Mémoire astronomique sur la différen

the operations of the officers of the royal marine employed to settle the boundaries between the Portuguese and Spaniards. With the exception of the maps of Egypt and of some parts of the East Indies, the most accurate work which exists, of any European continental possession out of Europe, is the map of the kingdom of Quito, drawn up by Maldonado. Every thing proves, that for these fifteen years past the Spanish government, far from dreading the progress of geography, has published all the interesting materials which it possessed on the colonies in the two Indies.

Having indicated the means, apparently the most proper, for speedily completing the maps of the kingdom of New Spain, I shall give a succinct analysis of the materials employed by me in the geographical work which I offer to the public.

The general map of the kingdom of New Spain is drawn up, as all the other maps drawn up by me in the course of my expedition are, according the projection of Mercator, with increasing lades. This projection has the advantage of ing at once the true distance of one place another; it is at the same time the most ble to the navigators who visit the colonies, , in fixing the position of their vessel by tains seen without difficulty, would wish y to correspond with the map. If I had se among the stereographic projections,

I should have given the preference to Murdoch's, which deserves to be generally followed. The scale of my map is 32 millimetres * for every degree of the equator. The scale of increasing latitudes is not founded on the tables of Don Jorge Juan, but on those which M. de Mendoza calculated for the spheroid.

To give a more suitable form to the map of Mexico, the scale was only extended from the 15° to the 41° of north latitude, and from the 96° to the 117° of longitude. These limits did not admit of giving in the same map the intendancy of Merida or the peninsula of Yucatan, which belongs to the kingdom of New Spain. To include in the map the most eastern point, which is Cape Catoche, or rather the island Cozumel, seven additional degrees of longitude are requisite, which would have forced me to comprize in the same map a portion of the kingdom of Guatimala, for which I have no data, all Louisiana, all western Florida, a part of the Tennessée, and of the Ohio.

It is in vain to seek, in this general map of New Spain, the Spanish establishments on the north west coast of America, establishments which insulated, and may be considered as colonies pendant on the metropolis of Mexico. To ex in the same map the missions of New Cali would have required an additional eight de

* 1.25987 In. English. *Trans*

longitude; for the most northern point of the kingdom is the presidio of San Francisco, situated, according to Vancouver, in 37° 48′ 30″ of north latitude, and 124° 27′ 45″ of west longitude. Hence a map of New Spain, to deserve the name of a general map, should embrace the immense countries included within the 89° and 125° of longitude, and within the 15° and 38° of latitude. To avoid the inconvenience of representing on a large scale countries which, in a political view, possess by no means the same interest, I wished to compress my labour within narrower bounds. I drew up, in a much smaller form, a second map, which not only exhibits in a coup d'œil all the territories which depend on the viceroyalty of Mexico, but which may also be consulted by those who wish to examine the different communications projected between the Atlantic ocean and the South sea. The motives which have occasioned this latter map to be extended to the port of Philadelphia, and even to the mouth of the Rio San Juan at Choco, will be explained in the sequel of his work.

Although, according to the principles often laid [illegible]n by me, I persist in preferring the new mea[illegible] to the old, I have not however added to my [illegible]he scale of centesimal degrees. The Bureau [illegible]itudes having constantly followed, both in [illegible]*ledge of Times* (Connoissance des Temps) [illegible]e new *Astronomical Tables* lately pub-

lished, the old manner of computing the latitudes, a single individual would in vain oppose the torrent, in publishing latitudes expressed in centesimal parts. It is to be hoped, however, that the introduction of the metrical system, fixed by the arrêté of the 13 Brumaire, year IX, will become gradually general. The degrees of longitude which I indicate are computed to the west of the meridian of the Imperial Observatory at Paris. If the great body of the public were not averse to even the most useful innovations, I should have preferred, to the meridian of Paris, the universal meridian proposed by one of the first geometricians of the age*, founded on the movement of the great axis of the solar ellipsis. This universal meridian is 185° 30′ to the east of Paris, which is 166° 46′ 12″ of the ancient sexagesimal division. It passes, consequently, by the South Sea, 12′ to the east of the isle of Erromanga, which belongs to the archipelago of the Holy Ghost (du Saint Esprit). The introduction of a universal meridian, founded on nature itself, which would not shock the national vanity of Europeans, is so much th[illegible] more to be desired, that we every day see [illegible] mented the number of first meridians arbitra[illegible] traced on maps. Spain, for several years h[illegible] reckons five: Cadiz, the most in use with n[illegible] tors; Carthagena; the new observatory at [illegible]

* *Exposition du Systeme du Monde*, par Laplac[illegible]

of Leon; the college of Nobles at Madrid, introduced by the beautiful maps of M. Antillon; and the point de la Galera at the island of Trinidad. To these five meridians might be added other two which pass through the Spanish possessions, and have been adopted by a great number of geographers: I mean the meridian of Teneriffe and of the island of Fer. The latter occasions inevitable confusion, d'Anville placing it between the town of Fer and Cape West. So that there are seven first meridians, without reckoning Toledo, in the sole dominions of the king of Spain.

I have followed, in the denomination of the seas which wash the coasts of Mexico, the ideas proposed by M. Fleurieu in his observations on the hydrographical division of the globe; a work in which the most enlarged views are united to a profound historical erudition. The Spanish names have often been added to facilitate the reading of travels written in Spanish.

In drawing up the map of Mexico, I began by [illegible]sembling together all the points fixed by astro-[illegible]cal observations, from which I formed a view, [illegible]ch, for the better appretiating the degree of [illegible]dence which the results deserve, indicates the [illegible] of the observation and the name of the [illegible]. The number of these points amounts [illegible] which 50 are situated in the interior of [illegible]y. Of this latter class there were only

fifteen known before my arrival at Mexico in the month of April, 1803. It may be useful to discuss some of the thirty-three points whose position is determined by my own observations, and which are all comprised between the 16° 50′ and 20° 0′ of latitude, and the 98° 29′ and 103° 12′ of longitude. While we are fixing these positions, we shall enter into some historical details respecting the extraordinary errors which have been propagated to this day in the most recent and current maps.

MEXICO.

Several meridian altitudes of the sun and stars gave me for the latitude of the capital at the convent of St. Augustin*, 9° 25′ 45″. The longitude deduced from the eclipses of the satellites of Jupiter, from the distances from the moon to the sun, from transference of the time from Acapulco, and from a trigonometrical operation for estimating the difference of [illegible]idians between Mexico and the port of Vera[illegible]s 6ʰ 45′ 42″ or 101° 25′ 30″. I shall obse[illegible]e for all, that I rely on the numbers which [illegible]t from the very careful calculations of M. Oltm[illegible]ns, a distinguish-

* The great gate of the cathedral church of Mexico is 12″ farther north, and 10″ farther east, than the convent of St. Augustin, near which I made my observations

ed geometrician, who calculated all the astronomical observations made by me since my departure from Paris in 1798, to my return to Bordeaux in 1804. The longitude of Mexico (6^h 45′ 28″) indicated in the new astronomical tables published by the *Bureau des Longitudes*, is founded on an astronomical memoir which I presented to the first class of the institute, the fourth Pluviôse, year XIII, in which the calculations of the moon had not been corrected by the tables of M. Bürg. A year before I had fixed on a result which was still nearer to the true longitude; the medium of my observations printed at the Havannah was 101° 20′ 5″.

Three emersions of the first satellite of Jupiter observed by me give for middle term, by the tables of M. Delambre, the longitude of 6^h 45′ 30″.

Thirty-two distances from the moon to the sun, calculated by M. Oltmanns, from the newest lunar tables, give for longitude 6^h 45′ 54″.

The transference of time from Acapulco gives for the difference of meridians between the port and the capital of Mexico, 2′ 54″ in time; consequently, supposing Acapulco 6^h 48′ 24″, the longitude of Mexico would be 6^h 45′ 29″.

Two observations of satellites, the one at Lancaster in Pensylvania, the other at the Havannah, both corresponding to the emersion which I observed at Mexico, the 2d May, 1803, give in longitude, the one 6^h 45′ $33\frac{1}{2}$″, the other 6^h 45′ 26″.

The longitude of Guanaxuato determined by lunar distances, and connected by my chronometer with that of Mexico, gives for that capital $6^h\ 45'\ 56''$.

From the trigonometrical operation, or rather from my attempt to connect the capital with the port of Vera Cruz, by means of the azimuths and angles of altitudes, taken on the volcanos of Orizaba and Popocatepec (according to the calculations of M. Oltmanns, and supposing Vera Cruz $6^h\ 33'\ 55''$), there results a longitude for Mexico of $6^h\ 45'\ 36''$.

All these results, obtained by ways so various and independent of one another, confirm the longitude that we assign to the capital of Mexico, which is more than a degree and a half different from what has been hitherto adopted; for the *Knowledge of Times* places Mexico in 1772, at 106° 1′ 0″, and again in 1804, at 102° 25′ 45″. The chart of the gulf of Mexico, published by the *Deposito Hydrografico* of Madrid in 1799, gives 103° 1′ 27″ to the capital; however, before I began to observe at Mexico, the true longitude was accurately enough known by three astronomers whose labours deserve to be better known, two of whom were bor[redacted] MM. Velasquez and Gama, so fa[redacted], had deduced from their observation o[redacted]he longitude of 101° 30′, but having no corresponding observations, and calculating after the old tables of Wargentin, they remained uncertain (as they themselves as-

sured me) for more than a quarter of a degree. This curious result is contained in a small pamphlet printed at Mexico*, very little known in Europe. Velasquez, director of the supreme tribunal of mines, fixed the longitude of the capital at 101° 44′ 0″, as is proved by valuable manuscripts preserved by M. Costanzo at Vera Cruz. In a map of New Spain sketched in 1772, Velasquez gave to Mexico 278° 9′ of longitude, reckoning from the isle of Fer=101° 51′. He says in a note to this map, "that before his voyage to California in 1768, all Mexico was placed in the South Sea; that his map is the first which offers the true position of the capital, and that he verified it by a great number of observations at Santa Rosa in California, at Temascaltepec, and at Guanaxuato." M. Galeano, one of the most able astronomers of the royal marine, had also found out the true position of Mexico, when he traversed the kingdom in 1791 to join the expedition of Malaspina. It is true that M. Antillon deduced the longitude of 101° 52′ 0″ from the observations of Galeano, a result which still differs from mine 1′ 48″ in time; but I suspect that this difference arises from some trivial error which [redacted]t into the calcu-

* Descripcion orthographica universal del eclipse de sol del dia 24 de Junio de 1778, dedicada al Sr. Don Joacquin Velasquez de Leon, por Don Antonio de Leon y Gama, 1778, p. IV.

lation. With the operations of Gama, Velasquez, and Galeano, I was totally unacquainted when I began my operations at Mexico. Moreover the detail of the observations of Don Dionisio Galeano was only communicated to me by M. Espinósa during the winter of 1804, after my return to Europe. These observations give a longitude apparently much more accurate than the one published by M. Antillon. "I was ignorant (the learned director of the *Deposito Hydrografico* of Madrid writes me) during your residence in Spain in 1799, of the observations of our common friend M. de Galeano. They consist of two emersions of satellites and the end of a lunar eclipse: they give me 101° 22′ 34″=6ʰ 45′ 30″." But M. Oltmanns found on taking the medium of the three observations, and comparing the eclipse of the moon at five different places in Europe, 6ʰ 45′ 49″. The difference between my observations and those of the Spanish astronomer, a supposed difference of nearly half a degree, is consequently reduced to less than an arc of two minutes. It is satisfactory to find so great a harmony among observers, who, unknown to one another, employed such different methods. In the very minute maps of Thomas Jefferevs, publish'd in 1794, Mexico is situated in 20° 2′ of latitude, and 102° 52′ 47″ of longitude; while M. Arrowsmith, in his beautiful map of the West Indies in four sheets, makes the

longitude of Mexico 102° 8′ 0″, and the latitude 19° 57′, false 32 minutes.

Several Mexican geometricians of the seventeenth century guessed pretty nearly the true longitude of the capital. Father Diego Rodriguez, of the order of N. Señora de la Merced, professor of mathematics at the imperial university of Mexico, and the astronomer Gabriel Lopez de Bonilla, adopted 7^h 25′ for the difference of meridians between Uranienburg and the capital, from whence there results the longitude of 101° 37′ 45″$=6^h$ 46′ 29″. But Don Carlos de Seguenza*, the celebrated successor of Rodriguez in the academical chair, was ignorant in 1681 of the observations on which Bonilla founded this result. He published a small treatise on the longitude of the city of Mexico†. He cites in it an observation of a lunar eclipse on the 10th December, 1619, by the engineer Henry Martinez, at Huehuetoca, to the north-west of Mexico. This is the same Dutch engineer who undertook the bold enterprize of the canal called

* Libra astronomica y filosofica escrita en 1681, por Don Carlos de Seguenza y Gongora, Catedratico de Matematicas de la Universidad de Mexico, y impresso en la misma Ciudad en 1690, §. 386.

† See the work above cited, §. 382, 385. I owe my acquaintance with this very rare book of Seguenza to M. Oteiza, who was kind enough to recalculate several old observations of the Mexican astronomers.

le Desague de Huehuetoca, of which more will be said hereafter. The observation of Martinez, comparing it with that of Ingolstadt, without applying any modification, would give $6^h\ 32'\ 16''$ for the longitude of Mexico. Compared with Lisbon, the same eclipse gives $6^h\ 22'\ 31''$. But as Martinez made use of no telescope, Seguenza supposes that by an effect of the penumbra, the end of the eclipse was $15'$ sooner. There results from this very arbitrary supposition, Mexico compared with Ingolstadt, $6^h\ 46'\ 40''$, and Mexico compared with Lisbon, $6^h\ 37'\ 31''$. M. Oltmanns justly observes, that one of the corresponding observations must be $9'$ false; for the true difference of meridians between Lisbon and Ingolstadt is only $1^h\ 22'\ 16''$, while the eclipse of the 20th December, 1619, would give $1^h\ 13'\ 0''$. Such old and careless observations can give no certainty; particularly as the two Mexican geometricians above cited, Rodriguez and Seguenza, were not themselves in a condition to obtain these results. They knew so little of the difference of meridians between Uranienburg, Lisbon, Ingolstadt, and the isle de Palma, that they concluded from the data indicated in the *Libra astronomica y filosofica,* that Mexico is $283^\circ\ 38'$ to the west of the first meridian of the isle de Palma, or $96^h\ 40' = 6^h\ 26'\ 40''$; a longitude which differs more than a hundred marine leagues from the true one, and more than 240 leagues from what was adopted by the geographer

Jean Covens in the middle of the last century. In the Ephemerides of Vienna, published by Father Hell, in 1772, and in the astronomical tables of Berlin for the year 1776, we find Mexico at 106° 0′. The idea of this too great western longitude is very old. M. Oltmanns found it in the observations* of the jesuit Father Bonaventura Suarez, who resided at Paraguay, in the city of the holy martyrs Cosme and Damian. This astronomer places Mexico 3^h 13′† to the west of his observatory, and the latter 3^h 52′ 23″ to the west of Paris; from whence results the longitude of Mexico 7^h 5′ 23″ = 106° 22′ 30″. The jesuits of Puebla also place the capital, in a Mexican map engraved in 1755, at 19° 10′ of latitude, and 113° 0′ of longitude, that is to say, 240 leagues too far west.

The account of Chappe's journey, drawn up by M. de Cassini, gives us no accurate information as to the position of the capital. Chappe even remained there only four days. He made no astronomical observations, and those which M. Alzate communicated to him were not of a nature to resolve the problem in question. This Mexican ecclesiastic, whom the academy of Paris named one of their correspondents, displayed more zeal than solidity in his researches: he embraced too many things at once. His acquisitions were very

* Ephemerides astronomicæ, a Triesneker, 1803.

† Voyage en Californie, 1772, p. 104.

inferior to those of Velasquez and Gama, two of his countrymen, whose true merit has never been sufficiently known in Europe. Don Josef Antonio Alzate, and Ramirez in his map of New Spain, published at Paris, place Mexico at 104° 9′ 0″= 6ʰ 56′ 36″. M. de Lalande finds, by the transit of Venus observed in 1769 by Alzate, 6ʰ 50′ 1″: M. Pingre finds 6ʰ 49′ 43′. An eclipse of the moon, observed in 1769 by Alzate, gives, calculating only the end by the old lunar tables, 6ʰ 37′ 7″. Cassini deduces from two emersions of Jupiter's satellites, observed by Alzate in 1770, and compared with the *old* tables by a medium, 101° 25′=6ʰ 45′ 9″.

In a memoir published by Alzate on the geography of New Spain*, he asserts that the longitude of Mexico, founded on observations of satellites, is 6ʰ 46′ 30″.

But in 1786, in a note which accompanies the plan of the environs of Mexico, drawn up by Seguenza, and engraved at Mexico, Alzate fixes the longitude at 100° 30′ 0″=6ʰ 42′ 0″, adding that this last result, *the surest of all*, is founded on more than twenty-five eclipses of satellites communicated to the academy of Paris†.

Hence there is consequently a difference of

* Gazetta de Mexico, 1788, No. 95, p. 56.

† Plano de les Arcanias de Mexico por Don Carlos de Seguenza, reimpreso en 1786, con algunas adiciones de Don Josef Alzate (en la imprenta de Don Francisco Rangel.)

more than two degrees between the different observations of M. Alzate, without including the result deduced from the eclipse of the moon of the 12th December, 1769. It is to be presumed that the observer was not exact as to the time. The longitude established by the satellites may be also too eastern, because the eclipses of the first satellite have not been separated from those of the third and fourth.

The false position so long attributed to the capital of New Spain produced a remarkable effect at the time of the sun's eclipse, 21st Feb. 1803. The eclipse was total, and threw the public into consternation, because the almanacs of Mexico, calculated on the supposition of $6^h\ 49'\ 43''$ of longitude, had announced it as scarcely visible. The learned astronomer of the Havannah, Don Antonio Roberedo, recalculated this eclipse according to my observations of longitude*. He found that the eclipse would not have been total if the longitude of Mexico were farther west than $6^h\ 46'\ 35'',4 = 101°\ 38'\ 49''$.

The latitude of the capital of Mexico remained for a long period as problematical as its longitude. In the time of Cortez the Spanish pilots fixed it at 20° 0′, as is proved by the map of California, drawn up by Domingo de Castillo in 1541, and

* Aurora, or Correo politico economico de la Havana, 1804, No. 219, p. 13.

published in the Mexican edition of Cortez's letters*. This latitude was preserved by d'Anville and other geographers. Jean Covens, who increased the longitude of Mexico seven degrees, gives it also a position too northern by 1° 43′. The account of Chappe's journey adopts from Alzate 19° 54′ of latitude. Don Vincente Doz, known for his observations in California, found by a quadrant 19° 21′ 2″†; but in the year 1778, Velasquez and Gama fixed the true position. Don Jose Espinosa found in February 1790, by a sextant of eight inches radius, the cathedral 19° 25′ 25″ of latitude. M. Galeano obtained in 1791, by larger instruments, 19° 26′ 00″.

VERA CRUZ.

Latitude, 19° 11′ 52″. Longitude, 6h 33′ 56″ =98° 29′ 0″. This longitude is deduced from a stellar eclipse, observed by M. Ferrer, and calculated by M. Oltmanns, from three eclipses of the first satellite, and from the longitude which my observations assign to the Havanna, and which has been connected by the transference of time to Vera Cruz. It is to be observed, that I indicate

* Historia de Nueva España escrita por Herman Cortes, aumentada por el Illustr. Señor Don Francisco Antonio de Lorenzana. Mexico, 1770, p. 328.

† Gazetta de Mexico, 1772, p. 56.

the position of the most northern part of the city, the observatory of M. Ferrer being the house of Don Jose Ignacio de la Torre, which is 30″ to the west of the fort of St. Juan d'Ulua.

This longitude is almost the same with what was found by Don Mariana Isasvirivil, and by other officers of the Spanish marine. It is only five minutes *en arc* farther west than what is indicated on the map of the gulf of Mexico, published in 1799 by the hydrographical board of Madrid. M. Antillon fixes it at 98° 23′ 5″; the *Knowledge of Times* for the year 1808, at 98° 21′ 45″. Don Thomas Ugarte, commodore (Chef d'Escadre) in the service of the king of Spain, connected by the transference of time Vera Cruz with Porto Rico. He assigns to the first port 98° 39′ 45″. M. Ferrer deduced in 1791 and 1792 the longitude of Vera Cruz from sixty series of distances from the moon to the sun and stars: he obtained as a middle-term, 98° 18′ 15″. But it would be exceedingly interesting to publish a detail of these observations, that they might be recalculated according to the tables of Bü[illegible] The same observation applies to the results published in Vancouver's voyage.

The city of Vera Cruz has shared the same fate with Mexico and the whole of the new continent. They have been believed 60, nay even 140 leagues farther distant from Europe than they are in reality. Jean Covens placed Vera Cruz at 104° 45′ 0″; Alzate, in his map of New Spain, at 101° 30′.

M. Bonne* justly complains of the want of agreement among the astronomical observations at Vera Cruz. After a long discussion he fixes on 99° 37′. This is nearly the same longitude which d'Anville and the French Neptune adopted, and it is that to which the English astronomers have long given the preference. The tables of Hamilton Moore indicate 99° 49′ 47″; but Arrowsmith (map of the Spanish possessions, 1803) makes it 98° 40′, and nine years before, Mr. Thomas Jeffreys, geographer to the king of England, 100° 23′ 47″.

If formerly the prevailing error was the assigning too great western longitudes to the American ports, the Abbé Chappe fell into the contrary extreme: he deduced from his chronometer the longitude of 97° 18′ 15″†. If this observer, who possessed more zeal than accuracy, could have taken the distances from the moon to the sun, he would have perceived the error of more than a degree, into which he had been induced by an excess of confidence in his chronometer.

The oldest astronomical observation at Vera Cruz (at the chateau St. Juan de Ulua) is undoubtedly that of the moon's eclipse in 1577. Comparing the end of that eclipse with a corresponding observation at Madrid, M. Oltmanns

* Atlas pour l'ouvrage de l'Abbé Raynal, p. 11.

† Voyage en Californie, p. 102.

found a difference of meridians of 6h 26′, and consequently the longitude for Vera Cruz of 102° 30′*.

The Abbé Chappe found the latitude 19° 9′ 38″†, a position too southern by three minutes. I examined the small quadrant of Chappe which remains at Mexico, in the hands of Father Pichardo; and I am by no means astonished, that, with so imperfect an instrument, his observations were so inaccurate. Other geographers formerly placed Vera Cruz 20′ too far to the south. The map of New Spain of Alzate indicates even a latitude of 18° 50′ 0″.

ACAPULCO.

This port, the finest of all those on the coast of the great ocean, lies according to my observations (at the house of the contador Don Baltasar Alvarez Ordoño) in 16° 50′ 29″ of latitude, and 6h 48′ 24″ = 102° 6′ 0″ of longitude. This position was deduced by M. Oltmanns from twenty-eight distances taken by me from the moon to the sun. Those of the 27th March, 1803, calculated according to the tables of Bürg, gave 6 48′ 32″; and those of the 28th March 6h 48′ 21″.

The difference of meridians between Mexico and

* Memoires de l'Academie pour l'année 1726.

† Voyage en Californie, p. 103.

Acapulco is, according to my chronometer, 2′ 54″ of time. Now Mexico, having been found by the medium of my lunar distances 6ʰ 45′ 42″ of longitude, there would result for Acapulco, excluding every other species of observation, 6ʰ 48′ 48″. An uncertainty of 19″ of time is very trifling for the comparison of two longitudes, deduced from simple distances from the moon to the sun. I found Acapulco in 1803, by the lunar tables of Mason, 102° 8′ 9″.

This position differs very little from what is indicated by the atlas which accompanies the voyage of the Spanish navigators to the Straits of Fuca, and which is 102° 0′ 30″ of longitude, and 16° 50′ 0″ of latitude. This atlas is founded on the operations of the expedition of Malaspina. However M. Antillon, in an excellent memoir above cited, gives a result, deduced from the same operations, which differs more than *a third of a degree*. He asserts, that the observations in 1791, by the astronomers who embarked in the corvettes la *Descuberta* and la *Atrevida*, fixed Acapulco at 102° 21′ 0″ of longitude; a result which appears to me less exact, though more conformable to the manuscripts left by these navigators in Mexico. They themselves deduced, from eight series of lunar distances, 102° 26′; from an immersion of the first satellite, 102° 20′ 40″; and from the tranference of time* from Guajaquil, 102° 22′ 0″; an ad-

* This chronometrical longitude of 102° 22′ is also found

mirable, but perhaps merely apparent, harmony, on account of the errors of the old lunar tables. Besides, the longitude, deduced in 1794 from the operations on board the brigantine Activo, was equally western. This expedition examined the coasts of Sonzonate and Soconusco, and fixed the longitude of Acapulco at 102° 25′ 30″; though I am completely ignorant of the nature of the observations on which this longitude is founded.

A note in the hand-writing of one of the astronomers of the expedition of Malaspina, left at Mexico, bears, that they thought themselves warranted to deduce, from some eclipses of satellites observed, at the same time, at the capital and Acapulco, a difference of meridians of 2′ 21″ in time. In placing, with the new maps of the *Deposito Hydrografico*, Acapulco at 102° 0′, we should find Mexico 101° 24′ 45″, which is, to within about 700 toises, the longitude given by the medium of all my operations. I should doubt, however, of the accuracy with which the distance from the capital to Acapulco was deduced. It is probably greater than 2′ 21″, though perhaps also somewhat less

in the minute plan of the port of Acapulco, drawn up by the expedition of Malaspina, and copied at the audience of the pilotage of Lima. It appears, in fact, that the astronomers of this expedition had at first adopted much more western positions than those afterwards adopted by the Deposito Hydrografico of Madrid. The difference for Acapulco is 20′, for Guayaquil 16′, for Panama and Realexo 18′, *en arc.*

than the 2′ 54″ given by my chronometer, worn out with five years travelling, and passing rapidly in so mountainous a region from the extreme heats of the coast, to the frosts of Guchilaque; that is to say, from a temperature of 36° to another of 5° of the centigrade thermometer.

Formerly Acapulco was placed four degrees further to the west in the South sea. Jean Covens and Corneille Mortier, in their map of the Mexican archipelago, make the longitude of Acapulco 106° 10′ 0″. The old maps of the depot of the marine make it 104° 0′. This longitude became gradually more eastern. Bonne, in the geographical memoir annexed to the work of Raynal, gives 103° 0′: Arrowsmith in 1803 makes it 102° 44′.

The *Knowledge of the Times* (Connoissance des Temps) for the year 1808, fixes Acapulco very well in point of longitude (102° 19′ 30″), but assigns it a latitude too southern by 10′. This error is so much the more striking, as, before the expedition of Malaspina, this port was placed at 17° 20′, or 17° 30′, as is proved by the maps of d'Anville and those of the marine depot. However, Covens makes the latitude 16° 7′, while in 1540 the pilot Domingo de Castillo gives it at 17° 25′. In the time of Herman Cortez, the capital of Mexico was believed to be three degrees to the west of Acapulco, almost north to south with the port de los Angeles. Probably the maps which the Mexicans themselves had constructed of

their coasts, and which the emperor Montezuma presented to the Spaniards, had an influence on this position. I have myself remarked among the hieroglyphic manuscripts in the collection of Boturini, preserved in the palace of the viceroy of Mexico, a very curious plan of the environs of the capital. I should add, that long before the observations of the expedition of Malaspina at Acapulco, those who were employed in astronomy at Mexico admitted, as certain, that the capital and port were in the same meridian.

JOURNEY FROM MEXICO TO ACAPULCO.

Having fixed the position of the three principal places of the kingdom, let us examine the two roads which lead from the capital to the South sea, and to the Atlantic ocean. The first may be named the Asiatic road, and the other the European; as these denominations designate the direction of the maritime commerce of New Spain. I determined, on these highly frequented roads, seventeen points either in latitude or longitude.

Village of *Mescala*.—I found its latitude, by the culmination of Antares, 17° 56′ 4″, and the longitude, by the chronometer, 6^h 47′ 16″, supposing Acapulco 6^h 48′ 24″. The city of Chilpanzingo, from angles taken at Mescala, appears to be 17° 36′ of latitude, and 6^h 46′ 53″ of longitude.

Venta de *Estola*, a solitary house in the midst of a wood near a fine spring. I took several altitudes of the sun there: the chronometer gave 6h 46′ 56″ of longitude.

The village of *Tepecuacuilco*.—Latitude found by the method of Douwes, uncertain to the extent of nearly 3′, 18° 20′ 0″.

Village of *Tehuilotepec*.—Longitude, 6h 47′ 12″. Double altitudes of the sun gave me 18°35′0″; but this latitude, determined under unfavourable circumstances, is uncertain from six to seven minutes. The position of this place is interesting, on account of the proximity of the great mines of Tasco.

Pont d'*Istla*, in the great plains of S. Gabriel, I found it 18° 37′ 41″ of latitude, and 6h 46′ 19″ of longitude.

Village of *San Augustin de las Cuesas*.—Longitude, 6h 45′ 46″. Latitude, 19° 18′ 37″. This village terminates on the west the great valley of Mexico.

It will be useful, for a minute acquaintance with the country, to add the distances which the natives, particularly the muleteers, who travel as it were in caravans to the great fair of Acapulco, reckon from one village to another. The true distance from the capital to the port being known, and supposing a third more for windings in a road both strait and of easy access, we shall find the value of the leagues in use in these countries. This datum is interesting for geographers, who in re-

mote regions must avail themselves of simple itineraries. It is evident that the people shorten the leagues as the road becomes more difficult. However, under equal circumstances we may have some confidence in the judgments formed by the muleteers of comparative distances; they may not know whether their beasts of burden go two or three thousand metres* in the space of an hour, but they learn from long habit if one distance be the third or fourth or the double of another.

The Mexican muleteers estimate the road from Acapulco to Mexico at 110 leagues. They reckon from Acapulco to the Passo d'Aguacatillo, four leagues; el Limon, three leagues; los dos Aroyos, five; Alto de Camaron, four; la Guarita de los dos Caminos, three; la Moxonera, one-half; Quaxiniquilapa, two and a half; Acaguisotla, four; Masatlan, four; *Chilpansingo*, four; *Sampango*, three; Sapilote, four; Venta Vieja, four; *Mescala*, four; Estola, five; Palula, one and a half; la tranca del Conexo, one and a half; Cuagolotal, one; Tuspa, or Pueblo nuevo, four; los Amates, three; Tepetlalapa, five; Puente de *Istla*, four; Alpuyeco, six; Xuchitepeque, two; *Cuernavaca*, two; S. Maria, three-fourths; *Guchilaque*, two and a half; Sacapisca, two; la Cruz del Marques, two; el Guarda, two; Axusco, two; San *Augustin de las Cuevas*, three; *Mexico*, four. In

* 6561 or 9842 feet English. *Trans.*

this itinerary the numbers indicate how many leagues one place is distant from the one which immediately precedes it. Other itineraries, which are distributed to travellers who come by the South sea, estimate the total distance at 104 or 106 leagues. Now, according to my observations it is in a straight line 151,766 toises. Adding a quarter for windings, we shall have 189,708 toises, or 1725 toises* for the league of the country.

JOURNEY FROM MEXICO TO VERA CRUZ.

I determined on this road thirteen points, either by purely astronomical means, or by geodesical operations, particularly by azimuths and angles of altitudes. M. Oltmanns deduced from my observations the position of the Venta de Chalco, on the eastern bank of the great valley of Tenochtitlan, 19° 16′ 8″; that of la Puebla de los Angeles (near the cathedral) 19° 0′ 15″ of latitude, and 6^h 41′ 31″=100° 22′ 45″ of longitude; of the Venta de Sotto, 19° 26′ 30″; of the village of Perote, near the fortress of the same name, 19° 33′ 37″ of latitude, and 6^h 38′ 15″ of longitude; of the village de las Vigas, 19° 37′ 10″; and finally, the position of the city of Xalapa, 19° 30′ 8″ of latitude, and 6^h 37′ 0″=99° 15′ 0″ of longitude. Don Jose Joacquin Ferrer, who, long before me, deter-

* 11040 feet. *Trans.*

mined several points in the environs of Vera Cruz and Xalappa, found for the last city 19° 31′ 10″ of latitude, and 99° 15′ 3″ of longitude. Both of us observed near the convent of St. Francis. In this fertile and cultivated region, four mountains, three of which are perpetually covered with snow, deserve the greatest attention. A knowledge of their exact position serves to connect several interesting points. The two volcanoes distinguished by the names of Puebla or Mexico (Popocatepetl and Iztaccihuatl) have been connected with the capital and the pyramid of Cholula. I found the latitude of Popocatepetl 18° 59′ 47, and 6^h 43′ 33″ = 100° 53′ 15″ of longitude; the latitude of Sierra Nevada, or Iztaccihuatl, 19° 10′ 0″, and 6^h 43′ 40″ = 100° 55′ 0″ of longitude. M. Costanzo deduced from a series of geodesical operations, 19° 11′ 43″ for the latitude of Iztaccihuatl, and 19° 1′ 54″ for that of Popocatepetl. The operations of this engineer having been made by means of a compass, and the magnetic declension depending on a great number of small local causes, we ought to be astonished at the accuracy of the results which have been obtained. These two colossal mountains, as well as the Pic d'Orizaba, being visible from the level of the pyramid of Cholula, I endeavoured very carefully to determine the position of this ancient monument. I found the latitude of the chapel which crowns the extremity of the pyramid, 19° 2′ 6″, and 6^h 42′ 14″ = 100° 33′ 30″ of longitude.

M. Ferrer deduced the position of the Cofre de Perote from the geodesical operations between l'Encero and Xalappa, and found 19° 29′ 14″. I was able, in spite of the rigour of the season, to carry instruments on the seventh of February, 1804, to the top of this mountain, which is 384 metres* higher than the Peak of Teneriffe. I observed there the meridian altitude of the sun, which gave for l'Alto de los Caxones (43″ *en arc* farther north than the summit or Peña del Cofre) 19° 29′ 40″ of latitude. The longitude was found by M. Oltmanns, who employed the angles taken by me between the Cofre and the Pic d'Orizava, 6h 37′ 55″, which differs but 26″ in time from that fixed by M. Ferrer.

The exact knowledge of the position of the Pic d'Orizaba is of great importance for navigators on landing at Vera Cruz. The chart of the gulf of Mexico, published in 1799 by the Deposito Hydrografico at Madrid, places this mountain a degree too far to the east, at 100° 29′ 45″ of longitude. *Angles of altitudes and azimuths taken by me, gave M. Oltmanns* 19° 2′ 17″ *of latitude, and* 99° 35′ 15″=6h 38′ 21″ *of longitude.* But long before me the Spanish mariners knew the true position of the Pic d'Orizaba. It would appear that the error of the map of the *Seno Mexicano*, which passed into the French map†, should

* 1260 feet. *Trans.*

† Carte des côtes du golfe du Mexique, d'après les observations des Espagnols, An. 9.

be attributed to some accidental mistake on the part of the engraver. It is corrected in the edition of M. Bausa in 1803. The name of the capital of Mexico is effaced in it, and the Pic d'Orizaba is placed at 99° 47′ 30″ of longitude. M. Ferrer fixes the mountain, as is proved by manuscripts in my possession, drawn up in 1793, at 19° 2′ 1″ of latitude, and 99° 35′ 35″ of longitude. The same result was also obtained by M. Isasvirivil, whose great accuracy I had occasion to know, having observed along with him at Lima and Callao in 1802.

It appears astonishing that the most recent map which we possess of that part of New Spain which we are analysing, and which bears the name of a justly esteemed author, should be the falsest of all. I speak of the large English map, which has for title, *Chart of the West Indies and Spanish Dominions in North America, by Arrowsmith*, published in June 1803. From Mexico to Vera Cruz the names appear to be scattered at random. The position of the Pic d'Orizaba is indicated in it in a manner which might prove dangerous to navigators. The following table gives the position of the principal points, such as this map, very beautiful in other respects, indicates them. I have added the result of my astronomical observations. The longitudes are reckoned to the east of Vera Cruz, to avoid introducing into this comparison the absolute position of this port.

CHART OF ARROWSMITH.			RESULTS OF ASTRONOMICAL OBSERVATIONS.		
	Latitude.	Longitude.		Latitude.	Longitude.
Mexico - - - -	19° 57′	3° 38′	Mexico - - -	19° 25′ 45″	2° 56′ 30″
Volcano of Mexico	19° 33′	3° 0′	Popocatepec - -	18° 59′ 47″	2° 24′ 15″
Puebla - - - -	19° 33′	2° 25′	Puebla - - -	19° 0′ 15″	1° 53′ 45″
Mount Orizaba -	20° 3′	1° 50′	Pic d'Orizaba - -	19° 2′ 17″	1° 6′ 15″
Volcano of Tlascala	19° 33′	1° 54′			
Perotte - - -	19° 48′	1° 37′	Perotte - - -	19° 33′ 37″	0° 59′ 45″
False Orizaba -	19° 51′	1° 12′			
Xalappa - - -	19° 36′	1° 0′	Xalappa - - -	19° 30′ 8″	0° 46′ 0″
Cordoba - - -	19° 15′	1° 6′	Cordoba - - -		

The errors of latitude are consequently of more than *half a degree*. It is difficult to conceive what is meant to be designed in the map of Arrowsmith by the three mountains named Orizaba, False Orizaba, and Volcano of Tlascala. They are all indicated to the *north-west* of the port of Vera Cruz, while the true Pic d'Orizaba (and the Mexicans know but one, called in the Azteque language Citlaltepetl) lies to the *south-west* of Vera Cruz, between the city of Cordoba and the villages of San Andres, San Antonio, Huatusco, and St. Jean Coscomatepec. There is added to the False Orizaba the note "visible to the eye at 45 leagues distance." Now Citlaltepetl is the summit which navigators first see in approaching the coast of New Spain; consequently it might be inferred that the learned English geographer named it *False Orizaba*. But in this case, the latitude of this problematical mountain would be a degree false, and Orizaba would be seven marine leagues to the north of the city of Xalappa, while in reality it is only twelve to the south-south-west. Or should the Pic d'Orizaba, of Arrowsmith be the Coffre de Perotte? But the Coffre lies also to the south-east, and not to the south-west of the village of Perotte. This fable of two mountains of the name of Orizaba is to be found also in the atlas of Thomas Jeffereys (*The West-Indian atlas, London*, 1794), where an attempt is made to convey minute information as to the road from Vera Cruz to Mexico. The latitudes are there 36′ false.

The difference of longitude between the port and the capital is marked 2° 29′ instead of 3° 38′ as in the map of Arrowsmith, and instead of 2° 56 30″ the result of my astronomical observations. It is also very improbable that the Volcano of Tlascala indicated in this new English map, is the Sierra de Tlascala, called in the country Malinche; for this Sierra is neither very remarkable for its elevation, nor very distant from la Puebla. This confusion is so much the more astonishing, as in 1803 the excellent observations of Don Jose Joacquin Ferrer, published in 1798, were known in London*, as well as the maps drawn up by the *Deposito Hydrografico* of Madrid; though even M. Antillon places it in 1802, in his map of North America, la Puebla 32′ too much to the south.

* Ephemerides geographiques de M. de Zach, 1798, T. II. p. 393. It is from this map that I cite the results obtained by M. Ferrer. They sometimes differ from those indicated in the manuscripts, which that excellent and indefatigable observer had, probably from less careful calculations, drawn up upon the spot, of which I am in possession of copies. I am bound to make this observation for the sake of those, who, having procured copies of my works, may be astonished at finding numbers in them differing from those now published by me. It is only after calculating carefully every observation that we can arrive at exact results.

POINTS SITUATED BETWEEN MEXICO, GUANAXUATO, AND VALLADOLID.

In two excursions which I made, the one to the mines of Moran and to the porphyretical summits (organos) of Actopan, the other to Guanaxuato and to the volcano of Jorullo in the kingdom of Mechoachan, I determined the position of ten points, whose longitudes are almost all founded on the transference of time. These points have enabled me to give with some accuracy a great part of the three intendancies of Mexico, Guanaxuato, and Valladolid. The longitude of the city of *Guanaxuato* was verified by distances from the moon to the sun. Its latitude, deduced from the observation of α de la Grue, is 21° 0′ 9″. Fomachant gave me 21° 0′ 28″, and β de la Grue, 21° 0′ 8″. The Jesuits in their map, engraved at la Puebla in 1755, placed Guanaxuato at 22° 50′ of latitude, and 112° 30′ of longitude, an error of 9°! M. Velasquez, who observed the satellites of Jupiter at Guanaxuato, found this city 1° 48′ to the east of Mexico, but at 20° 45′ 0″ of latitude, as is proved by his manuscript map of New Spain. This error of latitude is so much the more extraordinary, as the difference in longitude which it indicates is to within an arc of 1′, the same with what results from my observations.

Latitude of *Toluca* by α de la Grue 19° 16′ 24″, by Fomahant, 19° 16′ 3″. I endeavoured as much as possible constantly to observe the same stars to diminish any error from the uncertainty of the declination.

The position of Nevado de Toluca, the latitude of Patequero, a city situated on the banks of the lake of the same name, of Salamanca, St. Juan del Rio, and Tisayuca, are founded on imperfect observations. There are circumstances in which the method of Douwes gives very inaccurate results; but in a country presenting so few fixed points we must often be contented with a simple approximation. I think I can venture to assert, that the longitudes of Queretaro, Salamanca, and San Juan del Rio, may be confidently relied on.

Even in the valley of Mexico there are several very important points, the position of which was determined by Velasquez, the celebrated Mexican geometrician of the eighteenth century. This indefatigable man executed in 1773 an extensive survey along with a trigonometrical operation, to prove that the waters of the lake of Tezcuco might be conducted to the canal of Huehuetoca. M. Oteiza was kind enough to calculate for me the triangles of Velasquez, of which I possess the manuscripts. M. Oltmanns went over the same calculations. He subjected the positions of the signals to the latitude and longitude which we have here adopted for the convent of St. Augustin in

the capital of Mexico. These results of M. Oltmanns are contained in the table of geographical positions. No doubt can remain as to the oblique distances; but the want of observations of azimuths gives a little uncertainty to the reduction of the perpendiculars or differences in latitude and longitude. We shall return to this subject in the analysis of the map of the environs of Mexico.

The seventeen positions fixed by M. Ferrer in the environs of Vera Cruz depend on the longitude of that port. That longitude having been supposed by me 10° 45′ farther west than the Spanish astronomer indicates, I have reduced to the meridian of Paris the longitudes published by M. Ferrer, adding 8° 47′ 15″; for that observer calculated the lunar distances, from the *Knowledge of Times*, at an epoqua when Cadiz was believed to lie 8° 36′ 30″ to the west of Paris. I have for the same reason changed the absolute longitudes of Xalappa, the Cofre de Perotte, and the Pic d'Orizaba. M. Ferrer, for instance, places the latter at 90° 48′ 23″ of west longitude from Cadiz, while from the same meridian he fixes Vera Cruz at 89° 41′ 45″.

OLD AND NEW CALIFORNIA.

PROVINCIAS ITERNAS.

The north-west part of New Spain, the coast of California, and of what the English call New Albion, contain many points determined by the

most exact geodesical and astronomical operations of Quadra, Galeano, and Vancouver. Few European charts are better established than those of Western America, from Cape Mendocino to Queen Charlotte's Straits.

Cortez, after setting on foot two voyages of discovery in 1532, under Diego Hurtado de Mendoza, Diego Becerra, and Hernando de Griscalva, examined himself in 1533 the coast of California, and the gulf which has since very justly borne the name of the sea of Cortez*. In 1542 the intrepid Juan Rodriguez Cobrillo pushed as far north as 44° of latitude; the Sandwich Islands were discovered by Juan Gaëtan; and in 1582 Francisco Gali discovered the north-west coast of America under 57° 30′ of latitude; so that long before the intrepid Cook made this part of the great ocean to be known, which cost him his life, the same regions had been visited by Spanish navigators. But very often the rapid promulgation of discoveries does not depend upon him who makes them. Yet the merit of a private citizen is independent of the false policy of a government, which from an ignorance of its own interest would prevent a nation from enjoying the glory which it has earned. But this subject, equally delicate and interesting, has been treated with great discernment, in the historical introduction to the voyage

* Gomara *Hist.* cap. 12.

of Marchand, and in the introduction to the account of the Spanish expeditions undertaken for the discovery of the Straits of Fuca.

The observation of the transit of Venus in 1769, occasioned the voyage of MM. Chappe, Doz, and Velasquez, three astronomers, of whom the first was a Frenchman, the second a Spaniard, and the third a Mexican, and, what is more, the pupil of a very intelligent Indian of the village of Xaltocan. Before, however, the arrival of these astronomers in California, the true latitudes of Cape San Lucas and the mission of St. Rose had already been found by Don Miguel Costanzo, at present general of brigade and head of the corps of engineers. This respectable officer, who displays the greatest zeal for the geography of the country, found by gnomons and English octants of a very perfect construction, San Jose to be 23° 2′ 0″; and Cape San Lucas, 22° 48′ 10″. Till then it was believed, as is proved by the chart of Alzate, that San Jose lay in 22° 0′ of latitude.

The detail of the observations of the Abbé Chappe does not inspire much confidence. Provided with a large quadrant of three feet radius, Chappe found the latitude of San Jose by Arcturus 23° 4′ 1″; by Antares, 23° 3′ 12″. The medium of all the stellar observations differs from the result of the passages of the sun through the meridian by 31″. There are some of the solar observations which differ from one another 1′ 19″. M. Cas-

sini, however, calls them "very exact and very accordant*". I cite these examples, not for the sake of discrediting astronomers who have so many titles to our esteem, but to prove that a sextant of five inches radius would have been more useful to the Abbé Chappe than his quadrant of three feet radius, difficult both to place and to verify. Don Vicente Doz placed San Jose at 23° 5′ 15″ latitude. The longitude of this celebrated village in the annals of astronomy was deduced from the transit of Venus, and from the eclipses of Jupiter's satellites, observed by Chappe, and compared with the tables of Wargentin. M. Cassini fixed it by a medium at 7^h 28′ 10″, or 112° 2′ 30″. Father Hell adopted 7^h 37′ 57″ for San Jose. The longitude which results from Chappe's observations is 3° 12′ farther east than the one adopted in 1768 in the map of Alzate†. M. Velasquez too, the Mexican astronomer, constructed a small observatory in the village of St. Anne, where he observed by himself the transit of Venus, communicating the result of his observation to M. Chappe and Don Vicente Doz. This result, published by M. de Cassini, agrees very well with the manuscript observations which I procured at Mexico, and might

* Voyage en Californie, p. 106.

† Nouvelle Carte de l'Amérique Septentrionale, dediée á l'Académie Royale des Sciences de Paris par Don Joseph Antoine de Alzate et Ramiret, 1768.

serve to determine the longitude of St. Anne. Moreover, M. Velasquez, before the arrival of the Abbé Chappe, knew the enormous error in the longitude of California; he had observed eclipses of Jupiter's satellites in 1768 at the mission of Santa Rosa*; and he communicated to the Euro pean astronomers the true longitude before they had time to make the slightest observations.

The position of Cape San Lucas, called in Cortez's time Santa de San Jago† has been determined by the Spanish navigators. I found in manuscripts‡ preserved in the archives of the vice-

* Estado de la Geografia de la Nueva España y modo de perfeccionar la por Don Jose Antonio de Alzate (Periodico de Mexico, Diciembre 1772, No. 7, p. 55.)

† Mapa de California por Domingo de Castillo, 1541.

‡ M. Aranza, viceroy of Mexico, employed M. Casasola, *lieutenant de frégate* of the royal marine, to unite in four manuscripts whatever was connected with the navigations performed to the north of California, under the viceroys Bucarelli, Florez, and Revillagigedo. These works consist, 1st, in an atlas of twenty-six maps drawn up from the observations of MM. Perez, Canisarez, Galeano, Anadra, and Malaspina; 2d, in a large folio volume, entitled, *Compendio historico de las Navegaciones sobre las costas septentrionales de California ordenado en* 1799 *en la ciudad de Mexico;* 3d, in the voyage to the north-west coast of America, performed by Don Juan Francisco de la Bodega y Quadra, commanding the frigates Sta. Gertrudis, Aranzasa, Princesa, and the *goëllette* Activa, 1792; and, 4th, in a *Riconocimiento de los quatros Establecimientos Russos al Norte de la California en* 1788, a curious expedition executed by order of the viceroy Florez, and described by

royalty of Mexico, and compiled by order of the Chevalier d'Aranza, that M. Quadra found Cape St. Lucas 22° 52′ of latitude, and 4° 40′ to the west of the port of S. Blas, which, in placing S. Blas with Malaspina in 107° 41′ 30″, gives 112° 21′ 30″ for the most southern cape of California. The expedition of Malaspina fixed (according to M. Antillon) Cape S. Lucas at 22° 52′ of latitude, and 112° 16′ 47″ of longitude. This chronometrical position was also adopted in the atlas which accompanies the voyage of the Spaniards to the Straits of Fuca; it is, however, 17′ 13″ more western than that published (on what authority I know not) in the *Knowledge of Times* for 1808. I have adopted a difference of meridian between San Jose and the Cape of 14′ 17″; but it is to be observed, that these two points having never been connected together, but fixed singly by independent observations, there may be an error in the distance. From what I have gathered from those who have visited these arid desert regions, it would appear that the difference of longitude is somewhat greater. In the time of Cortez, Cape S. Lucas was believed to be 22° of latitude, and 10° 50′ to the west of the meridian of Acapulco, a relative longitude which is correct to within nearly half a degree.

Don Antonio Bonilla. Part of these valuable materials has been given to the public in the *Relacion del Viage de las Galetas Sutil y Mexicana*, published at Madrid in 1802.

The coast of New California has been explored with the greatest minuteness by the Spanish expedition of the galleys *Sutil* and *Mexicana* in 1792, and the country from 30° of latitude, or from the mission of S. Domingo, by the expedition of Vancouver. Malaspina and the unfortunate La Peyrouse had also made observations at Monterey. Though it may be supposed that the direction of the coasts and the differences of longitudes of several points are perfectly determined, it is difficult to fix their *absolute longitudes;* for the observations of lunar distances by Vancouver place the north-west coast of America 28′ to the east of the position in longitude assigned to it by Cook and Malaspina's expedition*. It would be very curious to examine the influence of the new lunar tables of Bürg on these observations of the English navigator. I have given the preference to the absolute longitude of Monterey, deduced from the operations of Malaspina, not only because it is founded on eclipses of stars and satellites, but particularly because the Spanish observations connect as it were, by transference of the time, New California with the old. The corvettes la Discubrerta and l'Atrevida, commanded by Don Alexandro Malaspina, determined chronometrically the difference of longitude between Acapulco, S. Blas, Cape S. Lucas, and Monterey. In adopting the

* *Voyage de Vancouver autour du monde*, T. II, p. 46.

more eastern position of the latter port, that is to say, what is given by Vancouver, the geographer is uncertain as to the situation of the southern coast. To avoid this difficulty, I have followed Malaspina in placing Monterey at 36° 35′ 45″ of latitude, and 124° 23′ 45″ of longitude*. La Peyrouse† found the longitude by lunar distances 123° 34′ 0″, by the chronometer 124° 3′ 0″‡. Vancouver deduced a longitude of 123° 54′ 30″ from 1200 distances of the moon from the sun. As the latter had leisure to survey the situation of the coast with the most scrupulous accuracy, I have ventured to rely on the difference of longitude indicated by him between Monterey and the missions of S. Diego, S. Juan, S. Buenaventura, S. Barbara, and S. Francisco. In this manner the positions of all these points have been connected with that of Monterey. Had I, however, traced all the north-west coast from the sole observations of Vancouver, I should have been tempted to render the longitude of Cape S. Lucas more eastern. It is sufficient to have here indicated the striking difference which yet subsists, notwithstanding the great pains bestowed, between the English and

* Analysis de la Carta de Antillon, 1803, p. 50.

† Voyage, T. III p. 304.

‡ M. Triesnecker, in correcting the result obtained by La Peyrouse, found by means of the lunar observations of Greenwich the longitude 123° 42′ 12″ in place of 123° 34′ 0″ (*Zach Corr.* T. I. p. 173.)

Spanish operations. I have reason to believe that the absolute positions laid down by us for Acapulco, S. Blas, and Cape Lucas, are sufficiently correct, and that the error of + 28′ *en arc* exists farther to the north. A false supposition in the diurnal course of a chronometer, and the state of the old lunar tables of Mayer and Mason, may have contributed to this error.

After discussing the positions which are founded on astronomical observations by experienced observers, I pass to those which may be regarded as doubtful, on account of the imperfection of the instruments, the want of confidence which the names of the observers inspire, and of our ignorance whether the results have not been drawn from manuscripts inaccurately copied. What follows is the substance of what I have been able to collect from these astronomical observations: they must be employed with caution; but they are valuable for the geography of a region hitherto so little known.

The Jesuits are entitled to the praise of having been the first who examined the gulf of California or the sea of Cortez. Father Kin, formerly professor of mathematics at Ingolstadt, and the declared enemy of the Mexican geometrician Siguenza, against whom he composed several writings, arrived in 1701 at the junction of the great rivers Gila and Colorado. He fixed by an astronomical ring the latitude of this junction at

35° 30′. I see from a manuscript map drawn up in 1541 by Domingo de Castillo, found in the archives of the family of Cortez, that at this epoqua two rivers were already known, which appeared to unite under the latitude of 33° 40′, and were called Rio de Buena, Guia, and Brazo de Miraflores. Three years before, in 1538, Father Pedro Nadal found by the meridian altitude of the sun, the junction of the Gila and Colorado, 35° 0′. Fray Marcos de Niza made it 34° 30′. It was undoubtedly on these grounds that Delisle adopted 34° in his maps: but in a work printed at Mexico*, recent observations are cited, made by means of an astronomical ring by two well instructed fathers of St. Francis, Fray Juan Diaz, and Fray Pedro Font; observations which agree with one another, and which would seem to prove that the junctions are much more southern than has hitherto been believed. In 1774, Father Diaz obtained at the mouth of the Gila, two days successively, 32° 44 Father Font found there, in 1775, 32° 47′. The former asserts also, that from a simple consideration of the road followed by him, that is to say, a consideration of the rhombs and distances, it is impossible that the junctions can be at 35° of latitude. The positions which Father Font assigned in 1777 to the missions of Monterey, S. Diego, and S. Francisco, and which differ but a few mi-

* *Cronica Serafica de Queretaro*, p. 11, 1792, *Prologo.*

nutes from the result of Vancouver and Malaspina's observations, would seem to testify in favour of the accurary of his labours, provided these fathers did not copy the data furnished to them by their pilots. Besides it is certain that a zealous observer may, with very imperfect means, procure often very satisfactory results. The latitudes obtained by Bouger in the Rio de la Magdalena, with a gnomon from seven to eight feet in height, and employing for a scale pieces of reeds, differ only from four to five minutes from what I found fifty-nine years afterwards by means of excellent English sextants.

However, Father Font appears to have been less fortunate with his astronomical ring in fixing the latitude of the mission of S. Gabriel at 32° 37′, that of S. Antonio de los Robles at 36° 2′, and that of Luis Obispo at 35° 17′. Comparing these positions with the atlas of Vancouver, I find that the errors are sometimes + 1° 11′, sometimes — 23′. It is true the English navigator did not himself visit these three missions, but he connected them with the neighbouring coast, the situation of which he examined. From hence may be seen how much we ought to be on our guard against observations made with astronomical rings. Fray Pedro Font visited also the site of the ruins called *las Casas grandes*; and he found them 33° 30′. This position, were it exact, would be very important; for it is the site of an ancient cultivation of the human

species. We must not, however, confound this second abode of the Azteques from which they passed from Tarahumara to Colhuacan *, with the Casas grandes, or the third abode of the Azteques, situated to the south of the presidio of Yanos, in the intendancy of New Biscay. I could wish to know the observations of the jesuit Father Juan Hugarte, who discovered, according to M. Antillon, the errors in the maps of California. He is even said to have first discovered that this vast country was a peninsula; but in the sixteenth century nobody in Mexico denied this fact, which was long afterwards doubted in Europe †.

I reckon among the operations somewhat doubtful, those which were executed by several Spanish engineer officers in the frequent and laborious visits which they made to the small forts situated on the northern frontiers of New Spain. I procured at Mexico the itineraries of brigadier Don Pedro de Rivera, drawn up in 1724; those of Don Nicholas Lafora, who accompanied the Marquis de Rubi in his researches, in 1765, as to a line of defence for the *provincias internas;* and the manu-

* In the original, *de la quelle ils passèrent de la Tarahumara à Colhuacan.* Translator.

† In 1539, Francisco de Ulloa, in an expedition undertaken at the expense of Cortez, explored the gulf of California to the mouths of the Rio Colorado. The idea of California's being an island has its date only in the seventeenth century. (*Antillon, Analysis,* p. 47, No. 55).

script travels of the engineer Don Manual Mascaro from Mexico to Chihuahua and Arispe *. These respectable travellers assure us, that they made observations of the meridian altitude of the sun. I know not what instruments they made use of; and it is to be feared that the manuscripts which came into my hands are not always exactly copied; for having taken the trouble to calculate the latitudes by the rhombs and distances indicated, I found results which coincided very ill with the latitudes observed. MM. Bauza and Antillon at Madrid made the same observation. I regret that none of the observations of latitude of the engineer officers are connected with places whose position has been determined by M. Ferrer or myself. M. Mascaro indeed observed at Queretaro. We differ 10′ in the latitude of that city; but my re-

* 1. Derotero del Brigadier Don Pedro de Rivera en la visita que hizo de los Presidios de las Fronteras de Nueva España en 1724.—2. Itinerario del mismo autor de Zacatecas a la Nueva Biscaya.—3. Itinerario del mismo autor desde el Presidio del Paso del Norte hasta el de Janos.—4. Diaria de Don Nicolas de Lafora en su Viage a las Provincias Internas en 1766.—5. Derotero del mismo autor de la villa de Chihuahua al Presidio del Paso del Norte.—6. Derotero de Mexico a Chihuahua por el Yngeniero Don Manuel Mascaro en 1778. —7. Derotero del mismo autor desde Chihuahua a Arispe Mission de Sonora.—8. Derotero del mismo autor desde Arispe a Mexico en 1785. The originals of these eight manuscripts are preserved in the archives of the viceroyalty of Mexico.

sult being founded on a method analogous to Douwes', is doubtful to nearly the extent of 2'. Notwithstanding these uncertainties, the materials of which I have spoken are of great use to those who would draw up maps of a part of the world so little visited by people of information. We shall content ourselves with discussing some of the most important points.

Mr. Jefferson in his classical work on Virginia has discussed the position of the Presidio de S. Fe in New Mexico; he believes it to lie in 38° 10′ of latitude; but striking a medium between the direct observations of M. Lafora and Fathers Velez and Escalante, we shall find 36° 12′. MM. Bauza and Antillon, by a union of ingenious combinations, and by connecting S. Fe with the Presidio de l'Altar, and this again with the coast of Sonora, found S. Fe de Nueva Mexico 4° 21′ to the west of the capital of Mexico*. The map of M. Antillon gives five degrees of difference. Without possessing any knowledge of the labours of these Spanish geographers, I arrived, by a different way, at a still greater result. I fixed the longitude of Durango by a lunar eclipse observed by Doctor Oteyza; this position agrees with the one adopted by M. Antillon; now, supposing the latitude of Durango 24° 30′, and that of Chihuahua, the capital of New Biscay, where M. Mascaro observed for

* *Analysis de la Carta*, p. 44.

a long time, 28° 45′, I have thus been able to estimate the value of the leagues indicated in the Itinerary of Brigadier Ribèra. The distances and rhombs gave me by graphical construction the difference of the meridians of Durango and Chihuahua 53′, from whence there results a difference of longitude between Mexico and Santa Fe of 5° 48′. It is natural enough that this difference should appear greater than what is indicated by MM. Bauza and Antillon, for these estimable geographers place the capital of Mexico 37′ *en arc* too far to the west. The position assigned by them to Santa Fe depends, however, more on the longitudes of S. Blas and Acapulco than on that of Mexico. I found Santa Fe at 107° 13′ of absolute longitude, MM. Bauza and Antillon at 107° 2′; a longitude extremely probable, but 5° 28′ more eastern than what is to be found in the map of west Louisiana published at Philadelphia in 1803. The same map is nearly four degrees false in the position of Cape Mendocino, notwithstanding the observations of Vancouver and the Spaniards. On the other hand, M. Costanzo concluded from a great number of combinations, that Santa Fe and Chihuahua were 4° 57′ and Arispe 9° 5′ to the west of Mexico. In all the old manuscript maps which I have consulted, particularly in those constructed since the return of M. Velasquez from California, Durango is placed three degrees to the east of the Parral and of Chihuahua. Velas-

quez reduced this difference of meridians to an arc of three minutes; but a graphical method, founded on itineraries, gives me 50′.

I was equally well pleased to see that on another point of the geography of New Spain, my combinations conducted me to the same result that had been obtained by the learned astronomers of Madrid. My map constructed at Mexico, the same year in which M. Antillon published his Analytical Memoir*, indicates, as is proved by the copies deposited in Mexico, the difference of meridians of Tampico and Mazatlan, (that is to say, the breadth of the kingdom from the Atlantic ocean to the South Sea, to be 8° 0′. MM. Bausa and Antillon found it 8° 20′, while the map of Lafora gives 17° 45′, and that of the West Indies by Arrowsmith, 9° 1′. In my map I have connected Tampico with the Bar de Santander, of which the longitude was observed by M. Ferrer, supposing, agreeably to the maps of the marine depot of Madrid, Tampico 10′ east of the Bar. We shall return in the sequel to the position of this port.

The latitude of the city of Zacatecas, celebrated for the great wealth of its mines, was determined by the Count de Santiago de la La-

* Analysis de los fundamentos de la Carta de la America septentrional.

guna, not by astronomical rings, or by gnomons, but by means of several quadrants of from three to four feet radius, constructed in the country itself: it was found 23° 0′. Don Francisco Xavier de Zarria concluded, from various gnomical observations, the latitude to be 22° 5′ 6″. These observations are to be found in a work almost unknown in Europe, the Chronicle published by the fathers of S. Francis of Queretaro at Mexico. Zacatecas was formerly believed half a degree farther north, as is proved by a small Table of Latitude, published at Mexico, by Don Diego Guadalaxara, for the use of those desirous of constructing gnomons. The Count de la Laguna asserts, that he found the longitude of Zacatecas 4° 3′ to the west of Mexico; but this result is probably very false. After fixing the position of Guanaxuata by the chronometer, and by lunar distances, I deduced from rhombs and estimated itinerary distances, a difference of meridians of 2° 32′. The calculations of M. Mascaro's itinerary give 3° 45′. As to the absolute longitude, the count fixes it in a manner equally erroneous. He pretends to have concluded from a corresponding observation of an eclipse at Bologna, that Zacatecas is 7^h 13′ 50″ to the west of that city, which would give 7^h 13′ 59″ of longitude for Zacatecas, and consequently 7^h 3′ 39″ (in place of 6^h 45′ 42″) for Mexico. Can

an error have glided into the figures? Perhaps the difference of meridians is 7h. 30′ in place of 7h 50′.

The longitude of Durango should be very nearly 105° 55′. Don Juan Jose Oteyza, a young Mexican geometrician, the benefit of whose abilities I have often experienced in the course of my operation, observed there (at l'Hacienda del Ojo, 38′ to the east of Durango) the termination of an eclipse of the moon, which, compared with the old tables of Mayer, gave the result which we have already indicated. The author even did not consider it as completely accurate. M. Friesen concluded from the rhombs and distances indicated in the itineraries of Brigadier Rivera and M. Mascaro, that this longitude was 5° 5′ to the east of Mexico, consequently 106° 30′. The latitude of Durango appears sufficiently doubtful. Rivera and his companion Don Francisco Alvarez Bareiro pretend to have found it, by meridian altitudes of the sun, 24° 38′; Lafora, in 1766, 24° 9′; but we do not know what instruments these engineers made use of. If the latitude which the Count de la Laguna, M. Zarria, and the engineer Mascaro assign to the city of Zacatecas is exact, that of Durango, deduced from the rhombs and distances, should be nearly 24° 25′.

There are several places in the northern provinces of New Spain, where the three engineers

already cited made observations successively; this circumstance gives somewhat more confidence in the medium result.

Chihuahua.—Latitude, 29° 11′ according to Rivera, 28° 45′ according to Mascaro. Longitude deduced from the rhombs and distances, 5° 25′ to the west of Mexico.

Santa Fe.—Latitude, 36° 28′ by Rivera, 36° 10′ by Lafora. Longitude by approximation, 5° 48′ in relation to the meridian of Mexico.

Presidio de Janos.—Latitude, 31° 30′ by Rivera, 30° 50′ by Mascaro. Longitude, somewhat doubtful, 7° 40′ to the west of Mexico.

Arispe.—Latitude, 30° 30′ by Rivera, 30° 36′ by Mascaro. Longitude by approximation, 9° 53′ (from Mexico).

Geographical combinations founded on itineraries give an additional probability to the following positions, of which MM. Mascaro and Rivera determined the latitude. These results, adopted in my map, agree with what was obtained by MM. Bausa and Antillon. We differ, however, nearly a degree in the absolute longitude of Arispe, a city situated in the province of Sonora, as well as in the longitude of the Passo del Norte, in New Mexico. But I have to repeat, that a part of these differences arises from M. Antillon's placing in his map Mexico, Acapulco, and the mouth of Rio Gila more to the eastward than I have done.

PLACES.	N. latitude.	West longitude from Mexico.
Guadalaxara - -	21° 9′	3° 57′
Real del Rosario -	23° 30′	7° 1′
Presidio del Pasage	25° 28′	4° 8′
Villa del Fuerte -	26° 50′	9° 5′
Real de los Alamos	27° 8′	9° 58′
Presidio de Buenavista	27° 45′	11° 3′
Presidio del Altar -	31° 2′	2° 41′
Passo del Norte -	32° 9′	5° 38′

On the formation of militia *(tropas de milicia)* in the kingdom of New Spain, there was drawn up a map of the province of *Oaxaca*, in which several places are found marked whose latitude (according to a remark of the author) had been observed astronomically. I do not know if these latitudes are founded on meridian altitudes taken with gnomons. The map bears the name of M. Don Pedro de Laguna, lieutenant-colonel in the service of his Catholic majesty. These eleven

points are partly situated on the coast between the two ports of Acapulco and Tehuantepec, partly near the coast in the interior of the country. Proceeding from west to east we find

PLACES.	LATITUDE.
Ometepec - - - -	16° 37′
Xamiltepec - -	16° 7′
Barra de Manialtepec	15° 47′
Pochutla - - -	15° 50′
Puerto Guatulco -	15° 44′
Guiechapa - -	15° 25′

In la Misteca alta the position has been determined of

S. Antonio de las Cues at 18° 3′ of latitude.

Teposcolula - - - - - 17° 18′.

Nochistlan - - - - - 17° 16′.

We may add the village of Acatlan in the intendancy of la Puebla at 17° 58′, and the city of Oaxaca at 16° 54′ of latitude. These determinations, if they have any degree of accuracy, are so much the more precious, that from la Puebla de

los Angeles to the isthmus of Panama, there was not hitherto a single point in the interior of the country whose latitude was astronomically determined. What gives us a certain degree of reliance on these positions, is the harmony which prevails between the latitudes assigned in the map of Don Pedro Laguna and in those of M. Antillon, to the city of Tehuantepec and to Puerto Escondido. Hence the Spanish navigators at present place the former port at 16° 22′, and the latter, which is in the neighbourhood of the village of Manialtepec, at 15° 50′ of latitude.

Hitherto we have discussed positions founded on astronomical observations, more or less worthy of the geographer's confidence; there remains for us to indicate the maps, almost wholly manuscript, which we have employed for the different ports of the general map of New Spain.

As to the bearings and sinuosities of the western coast washed by the great ocean, from the port of Acapulco to the mouth of the Rio Colorado, and to the volcanos of the Virgins in California, I have followed the map which accompanies the account of the voyage of the Spanish navigators to the Straits of Fuca. This map, published in 1802 by the marine depot at Madrid, is founded on the operations of the corvettes of Malaspina; but the coast which stretches to the south-east of Acapulco is still very imperfectly known. The map of North

America by M. Antillon was consulted in its construction. There is ground for complaint against the inaccuracy with which the eastern coast of Mexico to the north of Vera Cruz has been hitherto surveyed. The part contained between the mouths of the Rio Bravo del Norte and the Mississipi is almost as little known as the eastern coast of Africa between Orange River and Fish-Bay. The expedition of MM. Cevallos and Herera, provided with superb astronomical instruments, is engaged in taking exact plans of those desert and arid regions. Meanwhile I have followed, for the detail of the eastern coast, the map * of the gulph of Mexico, published by order of the king of Spain in 1799, and retouched in 1803. I have however corrected several points from the excellent observations of M. Ferrer, already cited. This able observer, having placed the port of Vera Cruz 9′ 45″ less to the west than is done by me, I have reduced the positions of the places determined by him in the environs of Vera Cruz, to the longitude resulting from the calculations of M. Oltmanns. The error of the old maps consisted especially in the longitude of the Bar of Santander, which, according to M. Ferrer, is 1° 45′ 15″ to the west of Vera Cruz, while the map of

* Carta esferica que comprehende las costas del Seno Mexicano, construida en el Deposito Hidrografico de Madrid, 1799.

the Deposito admits 1° 23′ of difference of longitude. I have constantly followed the observations of M. Ferrer, in reducing the longitude of Tanuagua on that of Santander.

The territory comprised between the ports of Acapulco and Vera Cruz, between Mexico, Guanaxuata, the valley of Santiago and Valladolid, between the volcano of Jorullo and the Sierra de Toluco, is constructed from a great number of geodesical surveys, taken by me either with a sextant or the graphometer of Adams. The part contained between Mexico, Zacatecas, Fresnillo, Sombreretc, and Durango, is founded on a manuscript plan which M. Oteyza had the goodness to construct for me, from materials collected by him in his journey to Durango. Having marked with great exactness the rhombs and the distances estimated from the pace of the mules, his plan merits undoubtedly some confidence, particularly as the positions of Guanaxuata and S. Juan de Rio were corrected by direct observations of my own, independent of one another. By this means it became easy to convert time into distance, and to ascertain the value of the leagues of the country.

The journals of MM. Rivera, Lafora, and Mascaro, which we have already cited, were of assistance for the *provincias internas*, particularly for the routes from Durango to Chihuahua, and from thence to Santa Fe and Arispe in the province of Sonora. However, these materials could only be

employed after long discussions and comparisons with the data collected by M. Velasquez in his expedition to California. The routes of Rivera very often differ a good deal from those of M. Mascaro; and we are particularly embarrassed as to the difference of meridians between Mexico and Zacatecas, or between Santa Fe and Chihuahua, as we shall afterwards have occasion to explain.

The geography of Sonora has been rectified by M. Costanzo. This philosopher, as modest as he is profound, has for thirty years been collecting whatever is connected with the geographical knowledge of this vast kingdom. He is the only engineer officer who has addicted himself to discussions on the difference in longitude of the most distant points from the capital. He has himself formed very interesting plans, in which we may perceive how far ingenious combinations may, to a certain point, supply the want of astronomical observations. I render this justice to M. Costanzo with the more pleasure, as I have seen many manuscript maps in Mexico, of which the scales of longitude and latitude appeared merely as an accidental ornament.

The following is an enumeration of the maps and plans consulted by me for the detail of my map; I think I have brought together every thing of importance which existed up to 1804.

Carte manuscrite de la Nouvelle Espagne, dressée par ordre du vice-roi Buccarelli, par MM.

*Costanzo et Mascaro**. It comprehends the immense space between the 39° and 42° of latitude, and extends from Cape Mendocino to the mouth of the Mississipi. Much care appears to have been bestowed on this work, which has served me for the Moqui, for the environs of the Rio Nabajoa, and for the route of the Chevalier la Croix in 1778, from Chihuahua to Cohahuila and Texas.

Mapa del Azobispado de Mexico, por Don Jose Antonio de Alzate†, a manuscript map drawn up in 1768, and revised by the author in 1772, and which, so far at least as I have examined it, is very bad. Several mining places are to be found in it, which are interesting for the mineralogist.

I have made no use of the map of New Spain, published at Paris in 1765, by M. *de Fer*, nor of that of Governor Pownall, published in 1777, nor even of the map of Siguenza, which the academy of Paris engraved under the name of Alzate, and *which has been hitherto looked on as the best map of Mexico.*

Carte generale de la nouvelle-Espagne‡ from the 14° to the 27° of latitude, drawn up by M.

* Manuscript map of New Spain constructed by order of the Viceroy Buccarelli, by MM. Costanzo and Mascaro. *Trans.*

† Map of the archbishopric of Mexico, by Don Joseph Antonio de Alzate. *Trans.*

‡ General map of New Spain.

Costanzo. This manuscript map is valuable for an acquaintance with the coast of Sonora. I consulted it also for the part which stretches out from Acapulco to Tehuantepec.

*Carte manuscrite des côtes depuis Acapulco jusqu'à Sonzonate**, executed by the brigantine *Activo*, in 1794.

Carte manuscrite de toute la nouvelle Espagne, dressée par M. Velasquez, en 1772†. It comprises the countries situated between the 19° and 34° of latitude, between the mouth of the Rio Colorado, and the meridian of Cholula. It was destined to exhibit the situation of the most remarkable mines of New Spain, particularly those of Sonora.

Carte manuscrite d'une partie de la Nouvelle Espagne‡, from the parallel of Tehuantepec to that of Durango, drawn up by order of the viceroy Revellagigedo, by *Don Carlos de Urrutia*. This is the only map of the country which exhibits the division into intendancies, and it has been very useful to me in this respect.

Mapa de la Provincia de la Compañia de Jesus de Nueva España‖, engraved at Mexico in 1765.

* Manuscript map of the coast from Acapulco to Sonzonate. *Trans.*

† Manuscript map of the whole of New Spain, drawn up by M. Velasquez in 1772. *Trans.*

‡ Manuscript map of a part of New Spain. *Trans.*

‖ Map of the Jesuits' province of New Spain. *Trans*

Is it by mere accident that this map, so bad in other respects, places Mexico at 278° 26′ of longitude, while the same capital is fixed at 270° of longitude, in the map which bears the title of *Mapa de distancias de los lugares principales de Nueva España**, engraved by the Jesuits at la Puebla de los Angeles, in 1755?

I found at Rome, *Provincia Mexicana apud Indos ordinis Carmelitarum (erecta 1588) Romæ* 1738. Mexico is there placed in 20° 28′ of latitude!

Father Pichardo de San Felipe Neri, a very well informed ecclesiastic, who possesses the small quadrant of the Abbé Chappe, was so kind as to furnish me with two manuscript maps of New Spain, the one by *Velasquez*, and the other by *Alzate*. They both differ from the map engraved by the academy of Paris, and are curious, as they exhibit the situation of several remarkable mining places.

Environs de Mexico; a map of Siguenza, republished by Alzate in 1786. Another map of the valley of Mexico is to be found annually in the almanac, entitled *la Guia de Forasteros* (the Stranger's Guide); it is by M. Mascaro. Neither these two plans, nor the one published by Lopez in 1785, exhibit the lakes in their actual situations.

* Map of distances of the principal places of New Spain. *Trans.*

In the map of Lopez, the degrees of longitude are marked on the meridian, a strange mistake for a geographer to the king!

Carte detaillée des environs du doctor, du Rio Moçtezuma (which receives the waters of the canal of Huehuetoca), *et de Zimapan par M. Mascaro**. The environs of *Durango*, of *Tolaca*, and of *Temascaltepec*, are to be found carefully represented in plans constructed by M. Juan Jose Oteyza.

Carte manuscrite de tout le royaume de la Nouvelle Espagna depuis le 16° au 40° de latitude, *par Don Antonio Forcada y la Plaza*, 1787†. This map appears to be ably constructed. Those who know the localities entertain the same opinion of the manuscript map of the *audience of Guadalaxara*, drawn up by M. Forcada in 1790.

Carte du pays compris entre le meridien de Mexico et celui de Vera Cruz, dressée par Don Diego Garcia Conde‡, lieutenant colonel and director of highways. This manuscript map is founded on the joint observations of M. *Costanzo* and M. Garcia Conde. It is a series of triangles

* Minute map of the environs of the Doctor, of the Rio Moctezuma, and of Zimapan, by M. Mascaro. *Trans.*

† Manuscript map of the whole kingdom of New Spain, by Don Antonia Forcada y la Plaza, 1787. *Trans.*

‡ Map of the country comprised between the meridians of Mexico and Vera Cruz, constructed by Don Diego Garcia Conde. *Trans.*

measured by the graphometer and compass. This work was executed with great care; and it exhibits, above all, a great minuteness in the part which includes the slope of the Cordillera from Xalappa and Orizaba to Vera Cruz.

*Carte des routes qui vont de Mexico a la Puebla, au nord et au sud de la Sierra Nevada**, drawn up by order of the viceroy the Marquis de Branciforte, by *Don Miguel de Costanzo.*

Plan manuscrit des environs de Vera Cruz†.—It extends to Perote, and indicates at the same time the difference of the roads projected from Xalappa to Vera Cruz.

Carte manuscrite du terrain contenu entre Vera Cruz et le Rio Xamappa, 1796‡.

Carte manuscrite de la province de Xalappa, avec les environs detaillés de l'Antigua et de la Nueva Vera Cruz ‖.

Carte manuscrite de la province d'Oaxaca et de toute la côte, depuis Acapulco a Tehuantepec *dressée par Don Pedro de la Laguna* §.—This

* Map of the roads from Mexico to la Puebla, to the north and south of the Sierra Nevada. *Trans.*

† Manuscript plan of the environs of Vera Cruz. *Trans.*

‡ Manuscript map of the country between Vera Cruz and the Rio Xamappa, 1796. *Trans.*

‖ Manuscript map of the province of Xalappa, with a detail of the environs of Antigua and la Nueva Vera Cruz. *Trans.*

§ Manuscript map of the province of Oaxaca and the whole coast from Acapulco to Tehuantepec, drawn up by Don Pedro de la Laguna. *Trans.*

map is founded on eleven positions, which are asserted to have been determined in latitude, by direct observations. As to the Rio Huasacualco, celebrated from the project of a canal to unite the South Sea with the Atlantic Ocean; I have assigned to it the course which I found traced in the plans of the two engineer officers, *Don Augustin Cramer*, and *Don Miguel del Corral*. These plans are preserved in the archives of the viceroyalty of Mexico.

Mapa anonimo de la Sierra Gorda, dans la province de Nuevo-Santander *, from the 21° to the 29° of latitude, a manuscript map painted on vellum, and ornamented with figures of Indian savages. It is very exact for the environs of Sotto la Marina and of Camargo.

The course of the rivers contained between the Rio del Norte and the mouth of the Rio Sabino was copied from a manuscript map which General Wilkinson communicated to me at Washington, on his return from Louisiana.

Mapa de la Nueva Gallizia †; a manuscript map constructed in 1794 by *M. Pagaza*, from his own observations and the map of M. Forcada.

Carte de la province de Sonora et de la Nouvelle Biscaye‡, dedicated to M. d'Azanza, and con-

* Anonymous map of the Sierra Gorda, in the province of Nueva Santander. *Trans.*

† Map of Nueva Gallizia. *Trans.*

‡ Map of the province of Sonora and of New Biscay. *Trans.*

structed at Cadiz, by the engineer *Don Juan de Pagaza.* This manuscript map, four feet in length, is very minute as to the mountainous places, where the savage Indians conceal themselves for excursions and attacks on travellers. It is also very minute as to the environs of the Passo del Norte, and particularly as to the desert territory called the *Bolson de Mapimi.*

*Carte manuscrite de la Sonora**, from the 27° to the 36° of latitude, dedicated to Colonel *Don Jose Tienda de Cuervo.* The author of this map appears to have been a German Jesuit, who had resided in the *Pimeria alta,* that is to say, in the most northern part of the province of Sonora.

Carte manuscrite de la Pimeria alta†.—It extends to the Rio Gila. The famous ruins of the Casas grandes are placed there at 36° 20° of latitude, an error of three degrees!

Mapa de la California, a manuscript map of Fathers Francisco Garces and Pedro Font, 1777. It has also been engraved at Mexico, but with an error of a diminution of three minutes for all the latitudes. It is interesting for la Pimeria alta and the Rio Colorado.

Carta geografica de la Costa occidental de la California que se descubrió en los años 1769 *y* 1775, *por Don Francisco de Bodega y Quadra y Don Jose Canizares, desde los* 17 *hasta los* 58

* Manuscript map of Sonora. *Trans.*

† Manuscript map of the Pimeria alta.

grados *.—This small map, engraved in 1788 by Manuel Villavicencio at Mexico, is drawn up on the meridian of S. Blas. It must interest those who study the history of discoveries in the great ocean.

The gulf of Cortez appears very much detailed in the map of California, which accompanies the *Noticia de la California del Padre Fr. Miguel Venegas*, 1757; but the true position of the missions actually existing in this peninsula is indicated in the map subjoined to the life of the Father *Fray Junipero Serra*, printed at Mexico in 1787.

Carte manuscrite de la province de la Nouvelle Biscaye †, from the 23° to the 37° of latitude, drawn up in 1792 by the engineer *Don Juan de Pagaza Urtundua*, from information obtained at Chihuahua. This curious work was executed by order of M. de Nava, captain-general of the *provincias internas*. It served me for the whole intendancy of Durango; though the environs of the town of Durango do not appear very accurate.

Carte manuscrite des frontieres septentrionales

* Geographical map of the western coast of California, discovered in 1769 and 1775, by Don Francisco de Bodaga y Quadra and Don Jose Canizares, from the 17° to the 58°. *Trans.*

† Manuscript map of the province of New Biscay. *Trans.*

*de la nouvelle Espagne**, from the 23° to the 37° of latitude, by the engineer *Don Nicolas Lafora*. It develops the plan of defence of the Marquis de Rubi, and served me for verifying the situation of the small forts named *Presidios*. I saw a copy of this same map, three metres† in length, in the archives of the viceroyalty.

Mapa del Nuevo Mexico‡, from the 29° to the 42° of latitude. This manuscript map is very minute with regard to the countries situated under the parallel of 41°. It contains details as to the lake *des Timpanogos*, and the sources of the *Rio Colorado* and the *Rio del Norte*.

Carte du nouveau Mexique, gravée en 1795, *par Lopez*‖. I have made no use of it. It appears exceedingly defective as to the sources of the *Rio del Norte*. The countries situated between these sources and those of the Missoury are better detailed in a *Map of Louisiana published at Philadelphia in* 1803.

I flatter myself that, notwithstanding great imperfections, my general map of New Spain has two essential advantages over all those which have hitherto appeared. It exhibits the situation of three

* Manuscript map of the northern frontiers of New Spain. *Trans.*

† Nine feet ten inches English. *Trans.*

‡ Map of New Mexico. *Trans.*

‖ Map of New Mexico, engraved in 1795 by Lopez. *Trans.*

hundred and twelve mines, and the new division of the country into intendancies: those mines which have been worked are there indicated from a catalogue which the supreme tribunal of mines caused to be drawn upon the spots, through the whole extent of that vast empire. I have distinguished by particular signs the places which are the seats of the *Deputaciones de Minas*, and the sites of the mines which depend on them. The catalogue with which I was furnished very often marked the rhomb and the distance from some more considerable town. These notes I combined with what I found in the old manuscript maps, among which those of Velasquez were of the greatest assistance to me. This labour was equally minute and troublesome. When any map did not bear the name of the mine, I placed it simply according to the situation in the catalogue, reducing the itinerary distances or leagues of the country into absolute distances, from combinations furnished by analogous cases. The population of New Spain being concentrated on the great interior plain of the central chain, it follows that the map of Mexico is covered very unequally with names. It must not however be supposed that there are districts entirely uninhabited, wherever the map indicates neither village nor hamlet. I wished only to enter places whose position was the same in several manuscript maps from which I laboured; for the most part of the American maps, executed in Europe, are filled with

names whose existence is unknown in the country itself. These errors are perpetuated, and it often becomes extremely difficult to conjecture their origin. I chose rather to leave a vacant space in my map than to draw from suspicious sources.

The indication of the chains of mountains presented difficulties which can only be felt by those who have been themselves employed in constructing geographical maps. I preferred *hatchings* (hachures) in orthographical projection, to the method of representing mountains in profile. This last, the oldest and most imperfect of all, occasions a mixture of two sorts of very heterogeneous projections. Yet I will not dissemble that this inconvenience is almost balanced by a real advantage. The old method furnishes signs which announce vaguely "that the country is hilly, that there exists mountains in such or such a province." The more this hieroglyphical language is vague the less it exposes to error. The method of hatching, on the contrary, forces the drawer to say more than he knows, more than it is even possible to know of the geological constitution of a vast extent of territory. To look at the last maps of Asia Minor and Persia, one would believe that learned geologists have ascertained the relative height, the limits, and direction of the mountains. We discover there chains which wind and branch out like rivers; we are tempted to believe that the Alps and Pyrenees are less known than these

distant countries. However, well informed people who have gone through Persia and Asia Minor assert, that the grouping of the mountains there differs entirely from the form in which they appear in the large map of Asia, published by Arrowsmith, so often copied both in France and Germany.

The waters undoubtedly in some sort give the delineation of the country; but the courses of rivers merely indicate the difference of level which exists in the extent of territory through which they run. A knowledge of the great vallies or of the basins; an examination of the points where rivers take their rise, are certainly extremely interesting to a hydrographical engineer; but it is a false application of the principles of hydrography, when geographers attempt to determine the chains of mountains in countries of which they suppose they know the course of the rivers. They suppose that two great basins of water can only be separated by great elevations, or that a considerable river can only change its direction when a group of mountains opposes its course. They forget that frequently, either on account of the nature of the rocks, or on account of the inclination of the strata, the most elevated levels give rise to no river, while the sources of the most considerable rivers are distant from the high chains of mountains. Hence the attempts which have been hitherto made to construct physical maps from

theoretical ideas have never been very successful. For the true configuration of the earth is so much the more difficult to be discovered, as the pelagick currents, and the greater number of the rivers which have changed the surface of the globe, have totally disappeared. The most perfect acquaintance with those which have existed, and those which actually exist in our days, might instruct us as to the slope of the vallies, but by no means as to the absolute height of the mountains, or the position of their chains.

I have traced on my map of New Spain the direction of the Cordilleras, not from vague suppositions or hypothetical combinations, but from a great variety of data furnished by persons who had visited the Mexican mines. The most elevated groupe of mountains is to be found in the environs of the capital, under the 19° of latitude. I examined myself the part of the Cordilleras of Analhuac, between the parallels of 16° 50′ and 21° 0′, for a breadth of more than 140 leagues. It was in this region that I made the greatest number of barometrical and geodesical measurements, of which the results served for my geological sections. The manuscript maps of M. Velasquez, and of MM. Costanzo and Pagaza, were of great use to me for the northern provinces. M. Velasquez, director of the *Tribunal de Mineria*, travelled over the greater part of New Spain; and he traced on the map which

we have already cited the branches of the *Sierra Madre de Anahuac*, the *eastern branch* which runs from Zimapan towards Charcas and Monterey, in the small kingdom of Leon, and the *western branch* which extends from Bolaños to the Presidio de Fronteras. The manuscript memoirs of M. Sonnenschmidt, a learned Saxon mineralogist, who visited the mines of Guanaxuato, Zacatecas, Chihuahua and Catorce, and the labours of M. del Rio, professor in the school for mines of Mexico, and of Don Vincente Valencia, residing at Zacatecas, have also furnished me with very useful information. I owe much also to the celebrated D'Elhuyar at Mexico; M. Chovell at Villalpando; M. Abad at Valladolid; M. Anza at Tasco; Colonel Obregon at Catorce; and a great number of rich proprietors of mines and religious missionaries, who were so good as to take an interest in my work. Notwithstanding all the pains I took to be informed as to the direction of the chains of mountains, I am far from regarding this part of my work as perfect. Occupied these twenty years in examining mountains and collecting materials for a geological atlas, I well know how hazardous an undertaking it is to trace the mountains on an extent of territory of 118,000 square leagues.

I could have wished to draw up on a large scale two maps of New Spain, the one physical, the other purely geographical; but I was afraid of rendering the work too voluminous. The hatch-

ings which designate the slope and undulation of the ground, afford at the same time a shade to the maps overcharged with names. These names become not unfrequently illegible, when an engraver attempts to produce a grand effect by the distribution of chiaro scuro. Hence the geographer who has carefully discussed the astronomical position of the places becomes uncertain whether he ought to preserve distinctness of character, or render more perceptible the relative height of mountains. One of the most beautiful maps which was ever published in France*, the one drawn up in the war depôt in 1804, sufficiently proves how difficult it is to reconcile two opposite interests, the interest of the geologist and that of the astronomer. The fear of giving too great an extent to my work, and the difficulties attending the publication of an atlas of which no government defrays the expense, made me abandon a project which I had once formed of joining to each section of territory a physical map in a horizontal projection.

* We have discussed in the eighth chapter the extraordinary regularity in the position of the Mexican volcanoes. I am uncertain as to the longitude of the *Pic de Tancitaro*, which has been twice surveyed from a distance. I fear some error has crept in at copying the angles; but the latitude of this Pic is sure enough to within about eight minutes.

II. MAP OF NEW SPAIN AND THE CONTERMINOUS COUNTRIES ON THE NORTH AND EAST.

I have already explained the motives by which I was induced to curtail my large map of New Spain within too narrow limits for representing, on the same plate, the whole extent of the kingdom from New California to the intendancy of Merida. The second map is destined to remedy this inconvenience. It shows at once, not only all the provinces which depend on the viceroy of Mexico and the two commandants of the *provincias internas*, but also the island of Cuba, whose capital may be considered as the military port of New Spain, Louisiana, and the Atlantic part of the United States. This map was drawn up by M. Poirson, an able engineer of Paris, from materials furnished to him by M. Oltmanns and me. It embraces the immense extent comprehended between the 15° and 42° of latitude, and the 75° and 130° of longitude. At first I meant to extend this map to the south as far as the mouth of the Rio San Juan, for the sake of indicating different canals, of which the construction was proposed to the court of Madrid, and which would serve to establish the communication between the two seas, to be discussed in the second

chapter of this work. But on perceiving that the peninsula of Yucatan, and the coast of Monterey, would not be represented with the developement which they deserved, I chose rather to preserve a larger scale, and to extend my map no farther south than the gulf of Honduras.

The principal part, that which comprehends the kingdom of New Spain, is a faithful copy of my large map, of which I have given an analysis. The Yucatan was added from the map of the gulf of Mexico, published by the *Deposito Hydrografico* of Madrid. New California was taken from the atlas which accompanies the account of the voyage of the corvettes *Sutil* and *Mexicana*, and from a memoir of M. Espinosa, printed in 1806, entitled, *Memoria sobre las observaciones astronomicas que han servido de fundamento a las cartas de la costa N. O. de America, publicadas por la direccion de trabajos hidrograficos.* When this memoir gave different results from those contained in the *Relacion del viage a Fuca*, they were preferred as founded on more solid bases*. The

* I have placed Monterey in latitude 36° 35′ 45″, and longitude 124° 12′ 23″, and Cape S. Lucas in latitude 22° 52′ 33″, longitude 112° 14′ 30″. The longitude of Monterey which I have definitively adopted with M. Espinosa, differs less from that of Vancouver than the result published by M Antillon. The difference between the opinion of the Spanish navigator and that of the English navigator is only an arc of 18′ as already stated. (Here it is of importance to observe, that the commencement of this geographical introduction,

work of M. Espinosa served me also for the small group of islands, named by M. Collnett the archipelego of Revillagigedo, in honour of a Mexican viceroy.

The islands of San Benedicto, Socorro, Rocca partida and Santa Rosa, situated between the 18° and 20° of latitude, were discovered by the Spanish navigators in the commencement of the sixteenth century. Hernando de' Grixalva discovered in 1533 the island of Santo Tomas, now named Isle del Socorro. In 1542, Ruy Lopez de Villalobos landed on a small island, to which he gave the name of la Nublada. He indicated very well its true distance from the island of Santa Tomas. This Nublada of Villalobos is now called San Benedicto. It is not so certain that the Rocca partida of the same navigator is the island of Santa Rosa of the modern hydrographers, for the greatest confusion prevails as to the position of this rock. Juan Gaetan* places it even two hundred leagues to the west of the island of *Santa Tomas*.

This last island is marked at 19° 45′ of latitude, and as a shallow of thirty-six miles in length, on the map of Domingo de Castillo drawn up in

from p. i. to p. xxxiii. was composed at Berlin in the month of September 1807, and that the remainder was published in the spring of 1809).

* Ramusio, t. I. p. 375 (edition of Venice, 1613).

1541, and found in the archives of the family of Cortez at Mexico. Since that time the groupe of islands of Revillagigedo has only been thrice seen; namely, by the pilot Don Josef Camacho, in 1779, in a navigation from San Blas to New California; by captain Don Alonzo de Torres, in 1792, in a voyage from Acapulco to San Blas; and lastly, by M. Collnett* in 1793. The observations of these three navigators are extremely discordant. Yet it would appear that M. Collnett has fixed exactly enough the position of the Isle del Socorro, from several series of distances of the moon from the sun. It is from these same distances calculated by Mason's tables that the whole groupe of islands has been thrown too far east.

As to the countries conterminous with New Spain, we have used for Louisiana the fine map of the engineer Lafond; and for the United States the map of Arrowsmith, rectified from the observations of Rittenhouse, Ferrer, and Ellicott. The positions of New York and Lancaster were dis-

* Collnett's voyage to the South Sea, p. 107. M. Collnett finds the latitude of Cape San Lucas 22° 45′, and the longitude 112° 20′ 15″. This latitude appears to be nearly seven minutes false! The mountain of San Lazaro, whose position is fixed by M. Collnett at 25° 15′ of latitude, and 114° 40′ 15″ (p. 92 and 94.) is undoubtedly not the same as that which Ulloa called, in 1539, Cape of San Abad, and which I have placed (after M. Espinosa) in 24° 47′ latitude, and 114° 42′ 30″ longitude.

cussed by M. Oltmanns in a scientific memoir inserted in the second volume of my collection of Astronomical Observations, p. 92. The same work contains the materials which have served for the island of Cuba. It would be superfluous to enter into greater details on a part which is merely an accessory of this map. Several points situated in the interior of the island of Cuba, and on the southern coast, between the ports of Batabano and Trinidad, were fixed by the astronomical observations which I made there, in 1801, before my departure for Carthagena.

III. MAP OF THE VALLEY OF MEXICO, OR, THE ANCIENT TENOCHTITLAN.

Few countries inspire so varied an interest as the valley of Tenochtitlan. It is the site of an ancient civilization of American people. Recollections, the most affecting, are associated, not only with the city of Mexico, but with more ancient monuments, the pyramids of Teotihuacan, dedicated to the sun and moon, of which a description will be given in the third book of this work. Those who have studied the history of the conquest, delight to trace the military positions of Cortez, and of the Tlascaltec army. The naturalist contemplates with interest the immense elevation of the Mexican soil, and the extraordinary form of a chain of porphyritic and basaltic mountains, which sur-

round the valley like a circular wall. He perceives that the whole valley is as the bottom of a dried up lake. The basins of fresh and salt water which fill the centre of the plain; and the five marshes of Zumpango, San Christobal, Tezcuco, Xochimilco, and Chalco, are to the eye of the geologist the small remains of a great mass of water, which formerly covered the whole valley of Tenochtitlan. The works undertaken for the preservation of the capital from the danger of inundations, if they do not offer to the engineer or hydraulic architect models for imitation, are at least objects worthy of fixing his attention*.

Notwithstanding the interest which this country offers in the triple relation of history, geology, and hydraulic architecture, there exists no map from the inspection of which any idea can be conceived of the true form of the valley. The plan of the environs of Mexico, published at Madrid by Lopez in 1785, and that of the *Guia de Forasteros de Mexico*, are founded on an old plan of Siguenza, drawn up in the seventeenth century. These sketches certainly do not merit the name of

* See what I afterwards say on the position of the old city of Mexico; on the pyramids of Teotihuacan; on the position of the lakes; on the artificial canal (Desague) by which the waters of the valley are drawn off into the gulf of Mexico, on the two plains of Cholula and Toluca, of which a part is also comprised in my map of the valley of Tenochtitlan, chap. VIII.

topographical maps; for they neither represent the actual situation of the capital, nor the state of the lakes in the time of Montezuma.

The plan of Siguenza, which is only twenty-one centimetres by sixteen*, is entitled, *Mapa de las aguas que per el circulo de noventa leguas vienen a la laguna de Tezcuco, delineado por Don Carlos de Siguenza y Gongora, reimpreso en Mexico con algunas adiciones en* 1786, *por Don Joseph Alzate.* The scale of latitudes and longitudes attached by M. Alzate to this plan of Siguenza is defective in construction to the extent of more than an arc of three minutes. The absolute longitude of the city, asserted by the learned Mexican to be the result of twenty-one observations of satellites of Jupiter, and believed by him to have been *approved* of and *verified* by the Academy of Sciences at Paris, is a degree false. This plan of M. Alzate has been servilely copied by all the geographers who have attempted to publish maps of the valley of Mexico. It gives the direct distance

a From the summit of the volcano of Popocatepetl to the village of Tesayuca, situated at the northern extremity of the valley, an equatorial arc of 1° 1′. (True distance 0° 53′.)

b From the centre of the city of Mexico to Huehuetoca, where the canal for the discharge of the lakes commences, 0° 32′. (True distance 0° 23′.)

* Eight inches by six. *Trans.*

c From Mexico to Chiconautla, 0° 20′. (True distance 0° 15′.)

d From the rock (Peñol) de los Baños to Zumpango, 0° 32′. (True distance 0° 21′.)

e From the Peñol de los Baños to San Christobal, 0° 13′. (True distance 0° 8′.)

f From the village of Tehuiloyuca to Tezcuco 0° 29′. (True distance 0° 21′.)

Here are errors of 16,000, even of 20,000* metres, in distances which M. Velasquez, in a geodesical operation in 1773, had measured with great accuracy, and as to which there does not remain a doubt of a hundred metres†. And yet M. Alzate might have availed himself of the triangles of Velasquez, as was done by Don Luis Martin, M. Oltmanns, and myself, in constructing the map which is inserted in this work. I made no astronomical observation at Pachuca, but I did so at the Real de Meran, whose latitude is greater than that of Pachuca. I found the latitude of Moran 20° 10′ 4″, and yet M. Alzate makes Pachuca 20° 14′. The old city of Tula is placed in his map too far north by nearly a quarter of a degree.

The plan of M. Mascaro, published in the *Guia de Mexico (Mapa de las cercanias de Mexico)* is only fourteen centimetres by ten‡, consequently it is about twelve times smaller than the one annexed

* About twelve miles and a half. *Trans.*

† Aboubt 109 yards. *Trans.*

‡ About five inches and a half by four. *Trans.*

to this work. It may be considered as a copy of the plan of Siguenza and Alzate. The northern part of the valley has, however, been somewhat straitened. The summit of the volcano of Popocatepetl is distant from Huehuetoca, according to Father Alzate, 1° 14′; and according to M. Mascaro 1° 11′. The true distance is 1° 1′, which results from connecting, by the triangles of Velasquez, Huehuetoca with the rock de los Baños, and this rock, by my astronomical observations, and by several azimuths, with the volcano of Popocatepetl and the pyramid of Cholula.

There exist maps, according to which the waters of the lakes adjoining the city of Mexico do not run north-east towards the gulf of Mexico, as is really the case, but north-west to the South Sea. This error is to be found along with many others in the map of North America, published at London by M. Bower, geographer to the king.

On my arrival at Mexico in the spring of the year 1800, I conceived the project of drawing up a map of the valley of Tenochtitlan. I proposed to fix, by astronomical observations, the limits of this valley, which has the form of a lengthened oval. I took besides a great number of angles of positions, from the tower of the cathedral of Mexico, the summit of the porphryry hills of Chapoltepec, and the Peñol de los Baños, the Venta de Chalco, the summit of the mountain of Chicle, Huehuetoca, and Tissayuca. The position of the two volcanos of la Puebla and

the peak of Axusco was determined by a particular hypsometrical method, that is to say, by angles of altitude and azimuths. Having very little time to bestow on this work, I could not flatter myself with bringing together in my map the great number of small Indian villages, with which the banks of the lakes are covered. My principal aim was carefully to ascertain the form of the valley, and to draw up the physical map of a country in which I had measured a great number of elevations by means of the barometer.

Circumstances of a favourable nature have enabled me to publish a topographical map from accurate materials. A respectable character, who, by a union rarely to be found in any country, possesses with a large fortune a strong love for the sciences, M. Don Jose Maria Fagoaga, wished to leave me a precious memorial of his country, in giving me at my departure from Mexico the sketch of a plan of the valley. On his invitation, one of my friends, Don Luis Martin, as good a mineralogist as he is an able engineer, drew up a map from the geodesical operations carried on at different times between the city of Mexico and the village of Huehuetoca, on account of the canals of Tezcuco, San Christobal, and Zumpango. M. Martin joined to these materials a part of the surveys communicated to him by me, in subjecting the delineation to the astronomical observations made by me at the extremities of the valley. The

numerous excursions which he had undertaken from a zeal for geology, enabled him to express, with a great deal of truth, the form and the relative height of the mountains which separate the plain of Mexico from those of Tula, Puebla, and Cuernavaca.

This map, which I owe to the obliging friendship of M. de Fagoaga, is not, however, the one which is inserted in this work. On examining and comparing it carefully; both with the triangulation of M. Velasquez, the detail of which I possess in an original manuscript, and with the table of astronomical positions ascertained by my observations, I perceived that the eastern bank of the lake of Tezcuco, and the whole northern part of the valley, required considerable alterations. M. Martin himself discovered the inaccuracy of his first sketch, and I engaged M. Oltmanns to reconstruct under his eye the map of the valley from the materials which I had collected. Every point was separately discussed; and when several surveys disagreed with one another, the mean term was adopted.

The following is the chain of the triangles measured by M. Velasquez, in 1773, from the rock of the baths (Peñol de los Baños), near the city of Mexico to the mountain of Sincoque, to the north of Huehuetoca. The angles were measured with an excellent English theodolite of ten inches diameter, provided with two glasses of twenty-eight inches in length.

Number of the Triangles.		Names of the Stations.	Angles observed.	Reduced distances (in Mexican varas, of which 2.32258 make a toise.) Note, a toise is equal to 76.7862 inches. *Trans.*	
I.	A.	Garita de Guadalupe	57° 42′	From A to B	4474.
	B.	Garita de Peralvillo	84° 57′	From B to C	6233
	C.	Cumbre del Peñol	37° 21′	From A to C	7346
II.	A.	Garita de Paralvillo	81° 27′	From A to C	4806
	B.	Cumbre del Peñol	40° 44′	From B to C	7283
	C.	San Miguel de Guadalupe	57° 49′		
III.	A.	San Miguel de Guadalupe	62° 25′	From A to C	29136
	B.	Cumbre del Peñol	103° 31′	From B to C	26560
	C.	Tezcuco	14° 4′		
IV.	A.	Cumbre del Peñol	61° 35′	From A to C	20229
	B.	Tezcuco	46° 25′	From B to C	24562
	C.	Cruzes del Cerro de S. Christobal	72° 0′		
V.	A.	Tezcuco	35° 1′	From A to C	20694
	B.	Cruzes del Cerró de S. Christobal	57° 19′	From B to C	14100
	C.	Creston de Chiconautla	87° 40′		

Number of the Triangles.		Names of the Stations.	Angles observed.	Reduced distances (in Mexican varas, of which 2.32258 make a toise.) Note, a toise is equal to 76.7862 inches. *Trans.*	
VI.	A.	Creston de Chiconautla	76° 35′		
	B.	Cruzes del Cerro de S. Christobal	53° 3′	From A to C . .	14631
	C.	Xaltocan	50° 22′	From B to C . .	17809
VII.	A.	Creston de Chiconautla	59° 47′		
	B.	Cruzes del Cerro de S. Christobal	76° 8′	From A to C . .	19677
	C.	Hacienda de Santa Iñes	44° 5′	From B to C . .	17513
VIII.	A.	Cruzes del Cerro de S. Christobal	23° 5′		
	B.	Hacienda de Santa Iñes	80° 46′	From A to C . .	17809
	C.	Xaltocan	76° 9′	From B to C . .	7072
IX.	A.	Xaltocan	65° 19′		
	B.	Hacienda de Santa Iñes	71° 30′	From A to C . .	11738
	C.	Zumpango	36° 11′	From B to C . .	10884
X.	A.	Zumpango	49° 34′		
	B.	Hacienda de Santa Iñes	74° 46′	From A to C . .	12718
	C.	Tehuiloyuca	55° 40′	From B to C . .	10033

Number of the Triangles.		Names of the Stations.	Angles observed	Reduced distances (in Mexican varas, of which 2.32958 make a toise.) Note, a toise is equal to 76.7862 inches. *Trans.*
XI.	A.	Zumpango	57° 12′	From A to C . . 20927
	B.	Tehuiloyuca	85° 30′	From B to C . . 17647
	C.	Sincoque (Cerro de)	37° 17′	
XII.	A.	Tehuiloyuca	24° 30′	From A to C . . 10783
	B.	Sincoque	29° 43′	From B to C . . 9020
	C.	Hacienda de Xalpa	125° 47′	
XIII.	A.	Hacienda de Xalpa	32° 19′	From A to C . . 12288
	B.	Sincoque	101° 44′	From B to C . . 6709
	C.	Loma del Potrero	47° 57′	
XIV.	A.	Loma del Potrero	113° 50′	From A to C . . 8672
	B.	Sincoque	37° 50′	From B to C . .
	C	Puente del Salto	28° 20′	

M. Velasquez measured two bases, the one of 3702½ Mexican varas in the plain, frequently inundated, which separates the village of San Christobal, and the hill of Chiconautla; and the other of 4474 varas on the causeway which leads from the capital to the sanctuary of S. Miguel de Guadalupe. The second base was even measured twice. In resolving successively the series of triangles according to these values, we shall find the direct distance from the cross of the mountain of San Christobal to the crest (Creston) of the Loma de Chiconautla. One of the bases gives for this distance 14099 varas, another gives 14101. The third triangle and the three last have each an obtuse angle, but in these same triangles an error of a minute in the sharpest angle would but produce a difference of three or four varas on the length of the sides. Hence this operation is very valuable for the topography of Tenochtitlan.

Particular signs indicate on my map the positions which are founded on the triangulation of M. Velasquez, and those which I determined astronomically. We have added the results of my measurements with the barometer, calculated according to the co-efficient of M. Ramond. To facilitate the use of the map to those who study the history of the conquest, I have placed the ancient Mexican names, beside the names at present in use. I have endeavoured to be very exact in

the Azteque orthography, following only Mexican authors, and not the works of Solis, Robertson, Raynal and Pauw, who disfigure the names of cities and provinces, like those of the kings of Anahuac.

IV. MAP, EXHIBITING THE POINTS WHERE COMMUNICATIONS HAVE BEEN PROJECTED BETWEEN THE ATLANTIC OCEAN AND SOUTH-SEA.

This map was drawn up for the sake of offering to the eye of the reader in one view the nine points which present means of communication between the two oceans. It will serve to explain what I have said in the second chapter of the first book. I have represented in nine assembled sketches the points of separation between the Ounigigah and the Tacoutche-Tesse, and those between the Rio Colorado and the Rio del Norte; the isthmuses of Tehuantepec, Nicaragua, Panama, and Cupica; the river of Guallaga, and the gulf of S. George; and lastly, the ravin from the Raspadura to the Choco, by which, since 1788, boats have passed from the Pacific to the Atlantic Ocean. The most interesting sketches are those of the small canal of derivation from the Raspadura and the isthmus of Tehuantepec. I have traced the course of the rivers Huasacualco (Guasacualco) and Chimalapa from materials which I found in the archives of the viceroyalty of Mexico, and particularly from

the plans of the engineers Don Miguel del Coral and Don Augustin Cramer, whom the viceroy Revillagigedo sent to the spot. The distances were rectified by itineraries very recently drawn up since the indigo of Guatimala came to pass through the forest of Tarifa, which is a new road opened to the commerce of Vera Cruz.

V. PLAN OF THE PORT OF VERA CRUZ.

This work would undoubtedly appear incomplete, if it did not contain the plan of the port from which all the Mexican wealth flows into Europe. To this day Vera Cruz is the only port which can receive European vessels of war. The plan which I publish is an exact copy of the one drawn up in 1798 by M. Orta, captain of the port of Vera Cruz. I have diminished the scale by one half, and added a few notes on the longitude, winds, atmospheric tides, and on the quantity of rain which falls annually. The mere sight of this plan proves the difficulty of every military attack against a country, which on its eastern coast offers no other shelter to vessels than a dangerous anchorage among shallows.

The double lines drawn on the plan of the port indicate the direction which vessels intending to anchor ought to follow. Whenever the pilot discovers the edifices of Vera Cruz, he should take care that the tower of the church of St. Francis

cover the tower of the cathedral. He will continue this route till the salient angle of the bastion of S. Crispin appear behind the bastion of St. Peter. He should then tack to the larboard, placing the prow towards the Isle of Sacrifices. Buoys (*palos de marca*) have been placed on the shallow of la Gallega near the point of the Soldado, to avoid the two dangerous rocks, called *Laxa de Fuera* and *de Dentro*.

VI. PHYSICAL VIEW OF THE ORIENTAL DECLIVITY OF THE TABLE LAND OF ANAHUAC.

The horizontal projections known by the name of geographical maps, give but a very imperfect idea of the inequalities of surface and physiognomy of a country. The undulations of the surface (*mouvemens du terrain*), the form of the mountains, their relative height, and the rapidity of the declivities, can only be completely represented in vertical sections. A map drawn up on the ingenious plan of M. Clerc* supplies to a certain degree the

* This learned geographical engineer, who presides over topography in the *Ecole Polytechnique*, possesses in an eminent manner the talent of representing the figure of a country. Nobody ever reflected more than he has done on the means of expressing undulations of surface, and a work which he means to publish on the construction of maps, and on the construction of *relievos*, will form an æra in the history of topography.

place of a relievo; and lines drawn on a plane which has but two dimensions may produce the same effect as a model in relievo, if the extent of ground represented is not too great, and if it is thoroughly known in all its parts. But the difficulties are almost insurmountable when the horizontal projection embraces a hilly country of a surface of several thousand square leagues.

In the most inhabited region of Europe, for example, in France, Germany, or England, the plains which are the seat of cultivation are only elevated, in general, a hundred*, or two hundred metres† above one another. Their absolute heights are too inconsiderable to have any sensible influence on the climate‡. Hence an accurate knowledge of these elevations is much less interesting to the cultivator than to the naturalist;—and hence also, in the maps of Europe, the geographers merely indicate the most elevated chains

* About 328 feet. *Trans.*

† About 656 feet. *Trans.*

‡ The interior of Spain presents a very striking exception; the soil of the Castiles in the environs of Madrid being six hundred metres of absolute elevation (about 1960 feet). See my memoir on the configuration of the soil of Spain, inserted in the itinerary of M. Alexandre de Laborde, T. I. p. CXLVII, CLVI. From the data contained in that memoir, the small geological map attached to the interesting *Rapport sur l'importation des Merinos, par M. Poyféré de Céré*, 1809, was drawn up. It is to be regretted, however, that this map was not drawn up in all its parts according to the same scale of elevation.

of mountains. But in the equinoxial region of the new continent, particularly in the kingdoms of New Grenada, Quito, and Mexico, the temperature of the atmosphere, its state of dryness or humidity, the kind of cultivation followed by the inhabitants, all depend on the enormous elevation of the plains which stretch along the ridges of the Cordilleras. The geological constitution of these countries is an object equally important for the statesman and the naturalist; from whence it follows that the imperfection of our graphical methods is much more sensible in a map of New Spain than in a map of France. Hence, to give a complete idea of the countries examined by me, of which the soil possesses so extraordinary a configuration, I have been compelled to recur to methods hitherto unattempted by geographers, because the most simple ideas are usually those which occur the last.

I have represented whole countries, vast extents of territory in vertical projections, in the manner in which the section of a mine or canal is drawn*. The principles on which similar physical views ought to be constructed are detailed in my Essay on geological *pasigraphy*. As the places of which

* The first attempt made by me in this way was the physical map of the river *de la Madaleine*, engraved, in 1801, against my will at Madrid. See my *Recueil d'Observations astronomiques*, vol. i. p. 370.

it is important to know the absolute height are rarely to be found on the same line, the section is composed of several planes, which differ in their direction, or rather of one plane which exhibits the average parallel line of direction on which the perpendiculars fall. In the last case the distances exhibited by the physical map differ from the absolute distances, particularly when the mean direction of the points whose height and position have been determined deviates considerably from the direction of the plane of projection.

In sections of whole countries, as in sections of canals, the scale of distances cannot be equal to the scale of elevations. If we were to attempt to give the same magnitude to these scales, we should be forced either to make the drawings of an immoderate length, or to adopt a scale of elevation so small that the most remarkable inequalities of the soil would become insensible. I have indicated on the plate by two arrows the heights which the Chimborazo and the city of Mexico would have, if the physical view were subjected to the same standard in all its dimensions. We see that in this case an elevation of 500 metres* would not occupy in the drawing more than the space of a millimetre†. But in employing for itinerary dis-

* About 1640 feet. *Trans.*

† .03937 of an inch. *Trans.*

tances the scale of elevations exhibited in the plates VI, VII, VIII, which is nearly 270 metres* to the centimetre†, a plate would be requisite of more than 15 metres‡ in length, to represent the extent of country comprised between the meridians of Mexico and Vera Cruz!. Hence from this inequality of scales, my physical maps, as well as the sections of canals and roads, drawn up by engineers, do not exhibit the true declinations of the soil, but these declinations, according to the nature of the projections employed, appear more rapid in the designs than they are in nature §. This inconvenience is increased if the plains of a great elevation are of very small extent, or if they are separated by deep and narrow vallies. It is from the proportion which the scales of distance and elevation bear to one another that the effect produced by the section of a country principally depends. I shall not enter here into a minute discussion of the principles followed by me in this kind of map. Every graphical method should be subject to rules, and it appeared to me so much the more necessary to point out some of these rules in this place, as the imitations of my views recently published are arbitrary projections on planes abounding with curves, of which nothing indicates

* About 885 feet. *Trans.*

† .39371 of an inch. *Trans.*

‡ About 55 feet. *Trans.*

§ See my *Essai sur la geographie des plantes, p.* 53.

the direction in relation to the great circles of the sphere.

Physical maps in vertical projections can only be constructed on knowing, for the points through which the plan of projection passes, the three coordinates of longitude, latitude, and elevation above the level of the ocean; and it is only in uniting barometrical measurements with the results of astronomical observations, that the section of a country can be drawn. This kind of projection will become more frequent in proportion as travellers shall addict themselves more assiduously to barometrical observations. But few provinces of Europe at this day offer the necessary materials for constructing views analogous to those published by me of equinoxial America.

The construction of the sections, plates VI, VII, VIII, are absolutely uniform. The scales are the same in all the three views; the scales of distance are to those of height nearly as one to twenty-four. The three maps indicate the nature of the rocks which compose the surface of the soil. This knowledge is interesting to agriculturists; and it is also useful to engineers employed in constructing roads or canals.

I have been blamed for not exhibiting in these sections the superposition or situation of the secondary or primitive strata, their inclination or their direction. I had particular reasons for not indicating these phenomena. I possess in my

itineraries all the necessary geological materials for forming what are usually called mineralogical maps. A great number of these materials were published by me in my recent work on the measurement of the Cordillera of the Andes; but on mature examination I adopted the resolution of separating entirely the geological sections which display the superposition of rocks from the physical views which indicate inequalities of surface. It is very difficult, I had almost said impossible, to construct a geological section of an extensive country, if this section must be subjected to a scale of elevation. A stratum of gypsum of one metre* thick is often more interesting to a geologist than an enormous mass of amygdaloid or porphyry; for the existence of these very slender strata, and the manner in which they lie, throw light on the relative antiquity of formations. How then shall we trace the section of entire provinces, if the magnitude of the scale is to be such as to exhibit masses so inconsiderable? How shall we indicate in a narrow valley, in that of Papagayo, for example, (Plate VII.) in a space of one† or two millimetres of breadth, which the valley occupies in the drawing, the different formations which repose on one another? Those who have reflected on graphical methods, and endeavoured to improve

* 39.371 inches. *Trans.*

† A millimetre contains .03937 of an inch. *Trans.*

them, will feel, like myself, that these methods can never unite every advantage. A map, for instance, overcharged with signs, becomes confused, and loses its principal advantage, the power of conveying at once a great number of relations. The nature of the rocks and their mutual superposition interest the geologist much more than the absolute elevation of formations and thickness of strata. It is sufficient if a geological section expresses the general aspect of the country, and it is only in freeing it from scales of height and distance that it can indicate luminously the phenomena of stratification, which it is of importance for geologists to know.

The physical view of the eastern declivity of New Spain is composed of three sections, which I have distinguished by different colours. The cities of Mexico, and la Puebla de los Angeles, and the small hamlet of Cruz Blanca, situated between Perote and las Vigas, are the points in which the intersection of the three planes of projection is made. I have added the longitude and latitude of these points, the medium direction of each section, and its length in French leagues of twenty-five to the degree.

The two great volcanos on the east of the valley of Tenochtitlan, the Pic d'Orizaba, and the Coffre de Perote, were placed in the drawing according to their true longitudes. We have represented them as they appear when a thick fog covers their

base, and when their summits are seen above the clouds. Notwithstanding the enormous breadth of these colossal mountains, we have not dared to represent their whole contours, on account of the great inequality of the scales of height and distance. These volcanos would have disfigured the view, rising like so many slender columns above the plain. I have endeavoured to represent very exactly the strange form, I had almost said the particular physiognomy, of the four great mountains of the Cordillera of Anahuac; and I flatter myself that those who travelled from Vera Cruz to Mexico, and who have been struck with the wonderful aspect of these majestic mountains, will perceive that the contours are exhibited with precision in this plate, and in No. IX and X.

That the reader may fix in his mind some important facts of physical geography, we have marked on the two sides of the views, near the scales of elevation, the height of the Chimborazo, and of several mountains of the Alps and Pyrenees; that of the limit of perpetual snows under the equator, under the parallel of Quito, and the 45° of latitude; the middle temperature of the air at the foot and on the slope of the Cordilleras; and lastly, the elevations at which certain Mexican plants begin to be seen, or cease to vegetate in the mountainous part of the country. Several of these phenomena are even repeated in all the maps; a repetition analogous to what all the thermometer

scales formerly exhibited, which indicated, though very inaccurately, the maximum and minimum of temperature observed under such or such a zone. I believed that these sections, which have some analogy with the large view in my Geography of Plants, might perhaps contribute to propagate the study of the natural history of the globe.

VII. PHYSICAL VIEW OF THE WESTERN DECLIVITY OF THE TABLE-LAND OF NEW SPAIN.

This and the preceding view, and the section of the valley of Tenochtitlan (Plate VIII.) are drawn up all three according to the principles laid down by me in discussing the section of the eastern slope of the Cordilleras. I have framed on the same scale Plates VII and VIII, that they may all be united at pleasure into one, which will then extend from the Atlantic Ocean to the South Sea, and which will develope to the geologist the extraordinary conformation of the whole country.

It may be necessary to observe to those who wish to unite the sections VII and VIII, in cutting the two vertical scales on which the heights of Puy-de-Dôme and Vesuvius are marked, that the planes of projection of these sections intersect each other almost at right angles, in the centre of the city of Mexico. The medium direction of the first section, which is itself composed of different

planes, is from east to west; the medium direction of the second, the road from Mexico to Acapulco, is from S.S.W. to N.N.W. The prolongation of the first section would extend nearly by Pascuaro and Zapotlan, to the Villa de la Purificacion. This plane prolonged to the west would terminate on the shores of the South Sea, between Cape Corrientes, and the port de la Navidad. As New Spain swells out singularly in this western direction, it would follow that the descent of the Cordillera, from the valley of Tenochtitlan to the plains of the intendancy of Guadalaxara, would be twice the length of the road from Mexico to Acapulco, sketched in plate VII. The barometrical measurements which I made between Valladolid, Pascuaro, Ario, and Ocambaro, prove, that in tracing this transversal section in the direction of the parallels of 19 or 20 degrees, the central plain would preserve the great elevation of 2000* metres for more than sixty leagues to the west of the city of Mexico, while, in the direction of the section, No. VII, the plane never reaches this elevation, after leaving the valley of Tenochtitlan towards the S.S.W.

Yet a section directed from east to west, from Vera Cruz to the small port de la Navidad, is far from giving a juster idea of the geological constitu-

* 6560 feet. *Trans.*

tion of New Spain than the reunion of my two sections, No. VII and VIII. A simple consideration of the true direction of the Cordillera of Anahuac is sufficient to prove what I advance. The central chain of the mountains runs from the province of Oaxaca to that of Durango, from the S.E. to the N.W.; consequently, the plane of projection, to be perpendicular to the longitudinal axis of the Cordillera, should not be placed parallel to the equator, but drawn from the N.E. to the S.W. By reflecting on the particular structure and limits of the groupe of mountains, in the neighbourhood of the capital of Mexico, we shall find that the reunion of the two sections, No. VII and VIII, gives a less imperfect representation of the conformation of the country than we should be tempted to believe from purely theoretical ideas. In this mountainous region between the 19° and 20° of latitude, nothing announces a longitudinal crest. There are none of those parallel chains which geologists always admit in their works, and which geographers represent in the most arbitrary manner, in their maps of the two continents, like ranges of elevated dikes. The Cordillera of Anahuac increases towards the north, from whence the inclined planes formed by the eastern and western declivities are not parallel to one another in their middle direction. This direction is almost N. and S. along the coast of the gulf of Mexico, while it is S.E. and N.W.

in the declivity opposite the Great Ocean. Hence the sections, to be perpendicular to the lines of declivity, cannot be in the same plane of projection.

VIII. PHYSICAL VIEW OF THE CENTRAL TABLE-LAND OF NEW SPAIN.

The section of the road leading from Mexico to the mines of Guanaxuato, the richest of the known world, was drawn up under my eye at Mexico, by M. Raphael Davalos*, a pupil of the school of mines, and a very zealous young man. This drawing displays to the naturalist the great elevation of the table-land of Anahuac, which extends to the north much beyond the torrid zone. The extraordinary configuration of the Mexican soil recalls the elevated plains of central Asia. It would be interesting to continue my section from Guanaxuato to Durango and Chihuahua, particularly to Santa Fe in New Mexico. For the table-land of Anahuac, as we shall hereafter prove†, preserves towards the north for an extent of more

* M. Davalos, as well as M. Juan Jose Rodriguez, a native of the Parral, in the *provincias internas*, and well informed in physical science, were so good as to assist me for several months in the construction of a great number of geological maps which will be afterwards published. I am pleased to have an opportunity of giving a public testimony of my gratitude to gentlemen so distinguished for their talents and application.

† Book I. and book III.

than two hundred leagues more than 2000*, and for an extent of five hundred leagues more than 800† metres of absolute elevation.

IX. PICTURESQUE VIEW OF THE VOLCANOS OF MEXICO OR LA PUEBLA.

This plate and the immediately following one were destined at first to appear in the physical atlas, which will accompany the historical account of my travels in the equinoxial regions. I mean to unite in that atlas such sketches as will show the physiognomy of the colossal summits which crown the ridge of the Cordilleras, and form as it were their crest. I thought that these contours, compared with those in the excellent itinerary of M. Ebel, or the beautiful drawings of M. Osterwald, might prove interesting to the geologists who wish to study comparatively the Alps of Switzerland, and the Andes of Mexico and Peru. Though the object of the work which I now publish is more to describe the territorial riches than the geological constitution of New Spain, I have thought proper to add to the Mexican atlas the picturesque views No. IX and X, to serve as a supplement to the map of the valley (Plate III.), and to give a more lively idea of the beauty of the situation of the city of Mexico. These same summits, the Popocatepetl and the Citlaltepetl, the first of which is visible at Mexico

* 6560 feet. *Trans.* † 2624 feet. *Trans.*

and Cholula, and the second at Cholula and Vera Cruz, served me to verify the meridian difference of the city of Mexico and the port of Vera Cruz by a method very advantageous, but hitherto little followed; that of perpendicular bases, azimuths, and angles of altitude *.

The city of Mexico is nearer by one half to the two *Nevados de la Puebla*, than the cities of Bern and Milan are to the central chain of the Alps. This great proximity contributes much to give an awful and majestic aspect to the Mexican volcanos. The contours of their summits, covered with eternal snow, appear so much the more marked, as the air through which the eye receives the rays is more rare and transparent. The snow is of a most extraordinary brilliancy, particularly when it descends from a sky of which the blue is always deeper than that of the sky which we see from our plains of the temperate zone. The observer finds himself, in the city of Mexico, in a stratum of air, whose barometrical pressure is only 585 millimetres †. It is easy to conceive, that the extinction of light must be very trifling in an atmosphere so little condensed, and that the summit of the Chimborazo, or the Popocatepetl, seen from the plains of Riobamba or Mexico, must exhibit

* See above, p. xxiii. and my *Recueil d'observations astronomiques*, vol. I. p. 373.

† Nearly twenty-three inches. *Trans.*

more distinct contours than if they were seen at the same distance from the shores of the ocean.

The *Iztaccihuatl* and the *Popocatepetl*, of which the latter has the conical form peculiar to the Cotopaxi and the Peak of Orizaba, are called indistinctly in the country the volcanos of la Puebla or Mexico, because they are equally well distinguished from these two cities. I have no doubt that the Iztaccihuatl, which Cardinal Lorenzana calls *Zihualtepec*, is an extinguished volcano; but no Indian tradition goes back to the time when this mountain, which in its contours resembles the volcano of Pichincha, vomited forth fire. The same observation applies to the *Nevado de Toluca*. The Spaniards have been in the habit, from the first times of the conquest, of naming every insulated summit *volcan*, which enters into the region of perpetual snow. The words *Nevado* and *Volcan* are frequently confounded: I have even heard at Quito, the strange expreſſions *Volcan de Nieve* and *Volcan de Fuego* *. The Cotopaxi, for example, is reputed a *fire-volcano*, because its periodical eruptions are known, while the Corazon and the Chimborazo are called *snow-volcanos*, because the natives suppose that the fire is concealed in them. In the kingdom of Guatimala †, and in the Philip-

* Snow-volcano and fire-volcano. *Trans.*

† "En Goatemala hay dos volcanos, uno de fuego y otro de agua." (*Lorenzana*, in a note to the Letters of Cortes.)

pine Islands, they call *water-volcanos (volcanes de agua)* those which inundate the surrounding country. From these examples, we may see that the word *volcan,* in Spanish maps, is frequently used in a sense quite different from what is understood by it among the other nations of Europe.

M. Don Luis Martin drew the volcanos of la Puebla as they appear in a clear day from the Terrace of the School of Mines—*(Seminario Real de Mineria)*. A justly celebrated artist, who honours me with a particular friendship, M. Gmelin of Rome, was obliging enough to retouch the drawing of M. Martin, and my sketch of the Pic d'Orizaba. The contours were nowise altered, and I have no doubt that the hand of a great master will easily be perceived in the distribution of shade, as well as in the effect of the chiaro-scuro.

It may be useful to observe, that the volcanos of la Puebla were drawn in the month of January, in a season when the inferior limit of perpetual snow almost descended to the height of the summit of the Peak of Teneriffe, or to 3800 metres of absolute elevation *. During my stay at Mexico, I saw such immense falls of snow in the mountains, that the two volcanos were almost united by one band of snow. The maximum † of elevation of the region of snow, which I found in the

* About 12460 feet. *Trans.*

† See book i. chap. ii.

month of November 1803, was nearly 4560 metres*.

The Sierra Nevada, or Iztaccihuatl, is only a few metres higher than Mount-Blanc; but the Popocatepetl surpasses Mount-Blanc 625 metres† in height. Besides, the plain which extends from the city of Mexico to the foot of the volcanos is itself more elevated than the summit of Mount-d'Or, and the famous passages of the lesser St. Bernard, Mount Cenis, Simplon, and the ports of Gavarnie and Cavarere.

It was between these two volcanos of la Puebla that Cortes passed with his troop and six thousand Tlascaltecs, on his first expedition against the city of Mexico. During this severe march, the valorous Diego Ordaz, to give the natives a proof of his courage, attempted to reach the summit of the Popocatepetl. Though he did not succeed in his undertaking‡, the emperor Charles V. gave him permission to enter a volcano in his coat of arms. I will not now agitate the question which is so often the subject of dispute at Mexico, namely, whether Francisco Montaño, after the taking of the capital, in 1552, drew the sulphur employed in the fabrication of powder from the

* 14956 feet. *Trans.*

† 2050 feet. *Trans.*

‡ *Cartas de Cortes*, p. 318 and 380; *Clavigero*, III. p. 68, and 162.

crater of Popocatepetl, or from some lateral crevice.

X. PICTURESQUE VIEW OF THE PIC D'ORIZABA.

The Pic d'Orizaba, on the position of which Mr. Arrowsmith and other geographers have thrown so much confusion in their maps, is as celebrated among navigators as the Pic of Teneriffe, the Silla of Caraccas, the Table Mountain, or the Pic S. Elie. I have drawn it as it appears in the road from Xalappa to the village of Oatepec (Huatepeque), near the Barro de Santiago. From this station nothing is discovered but the part which is covered with perpetual snow. The first plane of my drawing is a thick forest of liquid-ambar styraciflua, melastomes, strawberry trees, and pipers. It is very remarkable that the two largest Mexican volcanos, the Popocatepetl and the Citlaltepetl, have both the crater inclined to the south-east. We find in general, that in the equinoxial region of New Spain the mountains decline most rapidly towards the gulf of Mexico, and that the ridges of rocks are most frequently directed from the N. W. to the S. E. For the better distinction of active from extinguished volcanos, I have ventured to add a small column of smoke to the drawings of the Pic d'Orizaba and the great volcano of Puebla, though I never observed any smoke either from Xalappa or Mexico.

M. Bompland and myself saw a mass of ashes and very dense vapours issue from the mouth of the Popocatepetl on the 24th January, 1804, in the plain of Tetimpa, near San Nicholas de los Ranchos, where we made a geodesical survey of the volcano. The Pic of Orizaba, called also by the Indians *Pojauhtecatl* or *Zeuctepetl*, had its strongest eruptions between 1545 and 1566.

Eight years before my arrival at Mexico M. Ferrer measured the Citlaltepetl, in taking angles of altitude at a great distance from the summit of the volcano, near l'Encero. He gives it, in a memoir inserted in the transactions of the society of Philadelphia, the height of 5450 metres*. My measurement makes it 155 metres† lower. This measurement was taken in a small plain near Xalappa, where the angle of elevation of the summit is only 3° 43′ 48″. However, notwithstanding the extraordinary constancy of refractions in the tropics, and notwithstanding all the care which I took during the whole course of the expedition, I do not entertain the belief that I have been able to ascertain the height of a single American mountain, as accurately as the height of several mountains of Europe were ascertained by the geodesical operations of MM. Tralles, Delambre, Zach and Oriani. It is with these delicate operations, as with the chemical analysis of minerals; they are

* 17876 feet. *Trans.* † 508 feet. *Trans.*

never executed with great precision, but when we enjoy complete tranquillity, and the leisure which a traveller can seldom find in distant climates.

XI. PLAN OF THE PORT OF ACAPULCO.

The commerce of New Spain has but two openings, the ports of Vera Cruz and Acapulco. By the former, the commerce is carried on with Europe, the coast of Caraccas, the Havannah, the United States, and Jamaica. The latter is the central point of the South Sea and Asiatic commerce. It receives the vessels which come from the Philippine Islands, Peru, Guayaquil, Panama, and the north-west coast of North America.

It would be difficult to find two harbours which exhibit so great a contrast. The port of Acapulco appears an immense basin, dug by the hand of man, while the port of Vera Cruz does not even deserve the name of road. It is a disagreeable anchorage among shallows.

The plan which I now give of the port of Acapulco was never published, though many copies of it exist in America. It was taken in 1791, by the officers embarked with Malaspina, in the corvettes Descubierta and Atrevida. I suppose that the drawing was executed in the *Deposito Hydrografico* of Madrid. This drawing agrees very well

with another plan of Malaspina, of more than a metre * in length, which I examined at Acapulco while I was there in 1803.

The longitude which I assign to the port of Acapulco is greater than what is adopted in the *Voyage of la Sutil and Mexicana to the Straits of Fuca*. But according to a posterior memoir inserted in the almanack of Cadiz, the astronomers of the *Deposito Hydrografico* of Madrid now adopt a position for Acapulco much more western than mine. It is the same with what my chronometer gave, on reducing Acapulco to Mexico, and neglecting the lunar distances observed on the 27th and 28th of March, 1803.

M. Espinosa found Acapulco west from Paris, by transference of time from the port of San Blas †, 102° 17′ 21″; by two satellites of Jupiter, observ-

* 39.371 inches. *Trans.*

† It must be remarked, that the longitude of San Blas is only founded on two celestial observations, a satellite compared with the tables, and a lunar eclipse. The results of these two observations differ in an arc of 5′ 45″. The memoir of M. Espinosa affords an instructive example of the extreme prudence requisite in the use of the chronometer, if the chronometrical longitudes be not verified by other observations purely celestial. In Malaspina's expedition, four of *Arnold*'s chronometers gave to port Mulgrave, to within 9′, the same longitude of 142° 38′ 57″; and yet it has been proved by lunar distances that the true longitude is 142° 0′ 27″. The four chronometers had all changed their diurnal motion at the same time.

ed simultaneously at Greenwich and Paris, 102° 24′ 15″; and by eight satellites compared with the corrected tables, 102° 15′ 47″; the mean term of which is 102° 19′ 8″, the longitude adopted by M. Antillon in the analysis of the map of America. There were observed besides during the stay of Malaspina's expedition at Acapulco, in 1791, two stellar eclipses, for which there were however no corresponding observations in Europe. Captain Don Juan Tiscar calculated them from the tables of Bürg. He found Acapulco, by the eclipse of the 19th February, 102° 9′ 45″, and by the eclipse of the 15th April, 102° 35′ 45″. Distances of the moon from the sun, taken the 12th February, but calculated by groups, and without correcting the situation of the moon by the observation of a passage to the meridian, gave 102° 24′ 37″.

Here are a great number of determinations by very different means! All of them give a longitude *somewhat more western* than the result of my own observations, which I adopted before I had any knowledge of the interesting memoir of M. Espinosa. Stellar eclipses are certainly preferable to every other species of observation, if they are conducted under favourable circumstances. But the results of the eclipses of the two stars observed at Acapulco differ from one another, according to the calculation of M. Tiscar, 26′, and according to M. Oltmanns in an arc of 5′. The Spanish astronomers admit a very great error of the tables

for the first satellite. They make it 35″ in time, while M. Oltmanns, on comparing the tables of Delambre with observations from the month of January to the month of May 1791, finds the error of the tables only —7″, 6 for the immersions, and —14″ for the emersions. He believes, agreeably to the calculations published in the second volume of our collection of astronomical observations, that the true mean term of the observations of Malaspina's expedition is 102° 14′ 30″, and that by merely allowing half the value to our observations, we might fix the longitude of Acapulco at 102° 9′ 33″: that is to say, that it would be three minutes and a half further west than is indicated in my map. We ought not to be astonished at these doubts which remain as to the position of a port of the South Sea, when we consider that the longitude of Amsterdam was uncertain till a few years ago, not for three or four minutes, but the third part of a degree.

XII. MAP OF THE DIFFERENT ROUTES BY WHICH THE PRECIOUS METALS FLOW FROM ONE CONTINENT INTO THE OTHER.

The quantity of gold and silver annually sent by the New Continent into Europe amounts to more than nine-tenths of the produce of the whole mines in the known world. The Spanish colonies, for example, furnish annually three mil-

lions and a half of marcs of silver *, while in the whole of the European states, including Asiatic Russia, the total annual produce of the mines scarcely exceeds † the sum of three hundred thousand marcs ‡. A long stay in Spanish America enabled me to procure more exact information with respect to the metallic wealth of Mexico, Peru, New Grenada, and the viceroyalty of Buenos Ayres, than is to be found in the works of Adam Smith, Robertson, or Raynal. From thence I might naturally have entered into an investigation of the accumulation of the precious metals in the south and south-east of Asia; but a problem so important as this may constitute the subject of a particular memoir. I have thought proper to exhibit here the principal results of my researches, in a small map sketched at sea in 1804, on my passage from Philadelphia to France. This map indicates the flux and reflux of the precious metals. We observe in general that they move from west to east; a motion the reverse of that of the ocean, atmosphere, and the civilization of our species!

* 2,370,046 Troy pounds. *Trans.*

† See, as to the mines of Europe, the excellent statistical table of the produce of mines, annexed to the *Memoire general sur les Mines, par M. Heron de Villefosse*, p. 240. (Paris 1809, *chez Fr. Schoell.*)

‡ 203,130 pounds Troy. *Trans.*

XIII. FIGURES REPRESENTING THE SURFACE OF NEW SPAIN, AND OF ITS INTENDANCIES, THE PROGRESS OF MINING, AND OTHER OBJECTS RELATIVE TO THE EUROPEAN COLONIES IN THE TWO INDIES.

The collected figures in this plate serve to explain what is afterwards said * on the extraordinary disproportion between the extent of the colonies and the surface (*area*) of the European mother countries. The inequality of the territorial division of New Spain has been rendered sensible in representing the intendancies by squares inscribed above one another. This graphical method is analogous to what M. Playfair first employed, in a very ingenious manner, in his commercial and political atlas, and in his statistical maps of Europe. Without attaching much importance to these sketches, I cannot regard them as mere trifles foreign to science. It is true the map which M. Playfair gives of the national debt of England brings to mind the section of the Pic of Teneriffe; but natural philosophers have long indicated by similar figures the state of the barometer and mean temperature of months. It would be ridiculous to endeavour to express by curves, moral ideas, the prosperity of nations, or decay of their

* Chap. i. and chap. viii.

literature; but whatever relates to extent and quantity may be represented by geometrical figures; and statistical projections which speak to the senses without fatiguing the mind, possess the advantage of fixing the attention on a great number of important facts.

TABLE

Of the geographical positions of the kingdom of New Spain, determined by astronomical observations.

(The positions, marked with an asterisk, are established either by triangulations, or angles of altitude and azimuths.)

Names of places.	N. Latitude.	Longitude W. from Paris. In degrees.	In time.	Names of observers and remarks.
INTERIOR OF NEW SPAIN.				
Mexico	19° 25′ 45″	101° 25′ 30″	6h 45′ 42″	Humboldt, at the convent of St. Augustin.
S. Augustin de las Cuevas, (village)	19 18 37	101 27 0	6 45 48	idem.
Cerro de Axusco*, (mountain)	19 15 27	101 32 45	6 46 11	idem.
Venta de Chalco, (farm)	19 16 8	.. .. ..	.. .. ..	idem.
Moran, (mine)	20 10 4	100 46 0	6 43 4	idem.
Actopan, (village)	20 17 28	101 9 15	6 44 37	idem.
Totonilco el Grande, (village)	20 17 55	100 53 0	6 43 32	idem.
Tisajuca, (village)	.. .. ..	101 11 30	6 44 46	idem.
Toluca, (village)	19 16 19	101 41 45	6 46 47	idem.
Nevado de Toluca	19 11 33	101 45 38	6 47 2½	idem.
San Juan del Rio, (city)	.. .. ..	102 12 30	6 48 50	idem.
Queretaro, (city)	20 36 39	102 30 30	6 50 2	idem.
Salamanca, (city)	20 40	103 15 0	6 53 0	idem.

Names of places.	N. Latitude.	Longitude W. from Paris. In degrees.	In time.	Names of observers and remarks.
Guanaxuato, (city)	21° 0′ 15″	105° 15′ 0″	6h 53′ 0″	Humboldt, at the house of Don Diego Rul.
Valladolid, (city)	19 42 0	103 12 15	6 52 49	idem; at the bishop's-palace.
Patzquaro, (city)	. . . . .	103 40 0	6 54 40	idem.
Las Plajas de Jorullo, (farm)	. . . . .	103 20 30	6 53 22	idem.
Volcan de Jorullo *	. . . . .	103 21 45	6 53 27	idem.
Pont d'Istla, (farm)	18 37 41	101 34 45	6 46 19	idem.
Tehuilotepec, (village)	. . . . .	101 48 0	6 47 12	idem, near the water-spout machine
Tasco, (city)	18 35 0	101 49 0	6 47 16	idem.
Tepecuacuilco, (village)	18 20 0	101 48 0	6 47 12	idem.
Puente de Estola, (inn)	. . . . .	101 44 0	6 46 56	idem.
Mescala, (village,)	17 56 4	101 49 0	6 47 16	idem.
Popocatepetl*, (volcano)	18 35 47	100 53 15	6 43 33	idem, summit of the mountain,
San Nicolas de los Ranchos, (village)	19 2 0	100 41 0	6 42 44	idem.
Itztacihuatl *, (mountain)	19 10 0	100 55 0	6 43 40	idem.
Pyramide de Cholula, (ancient monument)	19 2 6	100 33 30	6 42 14	idem.
La Puebla de los Angeles, (city)	19 0 15	100 22 45	6 41 31	idem.
Venta de Sotto, (farm)	19 26 30	. . . . .	. . . . .	idem.

Names of places.	N. Latitude.	Longitude W. from Paris. In degrees.	Longitude W. from Paris. In time.	Names of observers and remarks.
Perotte, (village)	19° 33′ 37″	99° 33′ 45″	6h 38′ 15″	Humboldt.
Coffre de Perote, (mountain)	19 28 57	99 28 45	6 37 55	idem.
Las Vigas, (village)	19 37 37	.. .. ..	.. .. ..	idem.
Xalappa, (city)	19 30 8	99 15 0	6 37 0	idem.
Cerro de Macultepec, (mountain)	19 31 49	99 14 35	6 36 58	idem.
Pic d'Orizaba *, (volcano)	19 2 17	96 35 15	6 38 21	Humboldt and Ferrer, summit of the mountain.
El Encero, (farm)	19 28 25	99 8 32	6 36 34	Ferrer.
Tezcuco *, (city)	19 30 40	101 11 15	6 44 45	Velasquez.
Zumpango *, (village)	19 46 52	101 24 0	6 45 36	idem.
El Peñol *, (hill)	19 26 4	101 22 30	6 45 30	idem.
Xaltocan *, (village)	19 42 47	101 21 15	6 45 25	idem.
Tehuiloyuca *, (village)	19 43 17	101 28 5	6 45 54	idem.
Hacienda de Xalpa *, (farm)	19 47 58	101 29 45	6 45 59	idem.
Cerro de Chiconautla *, (hill)	19 38 39	101 16 0	6 45 4	idem.
San Miguel de Gaudalupe *, (convent)	19 28 48	101 24 45	6 45 39	idem.
Huehuetoca *, (village)	19 48 38	101 32 45	6 46 11	idem.
Garita de Gaudalupe *, (barrier)	19 28 38	101 24 45	6 45 39	idem.
Cerro de Sincoque *, (hill)	19 49 28	101 33 30	6 46 14	idem.
Hacienda de Santa Iñes *, (farm)	19 42 25	101 24 15	6 45 37	idem.

Names of places.	N. Latitude.	Longitude W. from Paris. In degrees.	Longitude W. from Paris. In time.	Names of observers and remarks.
Cerro de San Christoval *, (mountain)	19° 35′ 5″	101° 21′ 30″	6h 45′ 26″	Velasquez.
Puente del Salto *, (bridge)	19 54 30	101 36 0	6 46 24	idem.
EASTERN COAST OF NEW SPAIN.				
Campeche, (city)	19 50 45	92 50 45	6 11 23	Ferrer and Cevallos.
Punta de la Disconocida	20 49 45	92 44 30	6 10 58	Cevallos and Herrera.
Castillo del Sisal	21 10 0	92 29 45	6 9 19	idem.
Alacran, (western point)	22 27 50	92 7 40	6 8 30	idem.
Alacran, (northern extremity)	22 35 15	92 0 45	6 8 3	idem.
Mouth of the Rio de los Lagartos	21 34 0	90 30 15	6 2 1	idem.
Punta S. O. del Puerto	22 21 30	91 58 15	6 7 57	idem.
North point of the Conboy.	21 33 30	89 5 0	6 56 20	idem.
South point of the Conboy	21 28 50	89 4 0	6 56 16	idem.
Baxo del Alerta	21 33 0	89 11 15	6 56 45	idem.
Shallow of Diez Brazas	20 32 10	94 14 5	6 15 56	idem.
Small island to the S. W. of the triangle	20 55 50	94 31 52	6 18 7½	idem.
Baxo del Obispo	20 30 14	94 30 23	6 18 1½	idem.
Vera Cruz, (port)	19 11 52	98 29 0	6 33 56	Humboldt and Ferrer.
Island of Sacrifices, (centre)	19 10 10	98 26 40	6 33 47	Ferrer.
Shallow of the Pajaro	19 10 55	98 26 10	6 33 45	idem.
Isla Verde	19 11 16	98 25 26	6 33 42	idem.
Islote Blanquillas, (centre)	19 12 55	98 26 45	6 33 47	idem.

Names of places.	N. Latitude.	Longitude W. from Paris. In degrees.	In time.	Names of observers and remarks.
Anegada de Fuera (south point)	19° 12′ 12″	98° 24′ 35″	6h 33′ 38″	Ferrer.
——— (north point)	19 12 55	98 25 5	6 33 40	idem.
Gallega Shallow	19 13 20	98 28 22	6 33 53½	idem.
Punta Gorda	19 14 30	98 31 20	6 34 5	idem.
Mouths of the Rio Antigua	19 18 41	98 37 17	6 34 29	idem.
Bernal Chico	19 37 45	98 46 5	6 35 4	idem.
Bernal Grande	19 39 42	98 45 43	6 35 3	idem.
Punta Mari Andrea	19 43 15	98 45 43	6 35 3	idem.
Barra de Tamiagua	21 15 48	.. .. ..	.. .. ..	idem.
Santander, (city)	23 45 18	100 32 23	6 42 9½	idem.
Lago de San Fernando, or la Carbonera	24 36 0	100 18 40	6 41 16	idem.
Mouth of the Rio Bravo del Norte	25 55 0	99 51 10	6 39 25	idem.
WESTERN COAST OF NEW SPAIN.				
Acapulco, (port)	16 50 29	102 6 0	6 48 24	Humboldt, at the governor's house.
Western extremity of las Playas de Cujuca	17 15 0	103 5 15	6 52 21	Expedition of Malaspina.
Morro Petatlan, (hill)	17 32 0	103 48 45	6 55 15	idem.
Port de Selagu (a little doubtful)	19 6 0	106 53 5	7 7 32	idem.
Cabo Corrientes	20 25 30	107 59 0	7 11 56	idem.
Small island to the N. N. W. of Cape Corrientes	20 45 0	108 7 15	7 12 29	idem.

Names of places.	N. Latitude.	Longitude W. from Paris. In degrees.	In time.	Names of observers and remarks.
Cerro del Valle (hill)	21° 1′ 30″	109° 35′ 0″	7h 18′ 20″	Expedition of Malaspina.
Iles Marias, (Cape south of the most eastern)	21 16 0	108 37 45	7 14 31	idem.
Mountain of San Juan	21 26 15	107 23 0	7 9 32	idem.
San Blas, (port)	21 32 48	107 37 45	7 10 31	idem.
Piedra Blanca	21 33 0	107 47 45	7 11 11	idem.
Isle San Juanico	21 45 30	109 1 35	7 16. 6	idem.
Islote Isabella	21 50 30	108 17 5	7 13 8	idem.
Cape San Lucas	22 52 23	112 13 15	7 28 53	idem.
Mission de S. Josef, (village)	23 3 25	112 3 25	7 28 14	idem.
Mission de Todos los Santos	23 26 0	112 38 15	7 30 33	idem.
Mountain of San Lazaro	24 47 0	114 41 15	7 38 5	idem.
Mountain to the north of the Abreojos	26 59 30	116 8 15	7 44 33	idem.
Island of Cedars, (south point)	28 2 10	117 43 15	7 50 33	idem.
Isla de San Benito (the highest part)	28 18 22	118 6 15	7 52 25	idem.
Isla Guadalupe, (Cape south)	28 53 0	120 37 15	8 2 29	idem.
Isla de San Bernardo	29 40 40	118 17 15	7 53 9	idem.
Isla de S. Martin or de los Coronados (the largest and most eastern islot	32 25 10	119 38 55	7 58. 36	idem.
San Diego, (port)	32 39 30	119 38 15	7 58 33	Vancouver and Malaspina.
Isla S. Salvador, (south point)	32 43 0	120 50 15	8 3 21	Expedition of Malaspina.

Names of places.	N. Latitude.	Longitude W. from Paris. In degrees.	In time.	Names of observers and remarks.
Isla San Nicolas, (west cape)	33° 16′ 30″	121° 56′ 15′	8h 7′ 45′	Expedition of Malaspina.
San Juan, (mission)	33 29 0	120 13 30	8 0 54	Vancouver and Malaspina.
Isla de Juan Rodriguez Cabrillo, (west cape)	34 0 0′	122 51 15	8 11 25	Expedition of Malaspina.
Santa Buenaventura	34 17 0	121 45 30	8 7 2	Vancouver.
Presidio de Santa Barbara (mission)	34 26 0	122 5 30	8 8 22	Vancouver and Malaspina.
Monterey, (Presidio)	36 36 0	124 11 8	8 16 44½	Expedition of Malaspina.
Punta del Año Nuevo	37 9 15	124 42 53	8 18 51½	idem.
Farallones, (rocks)	37 48 10	125 21 15	8 21 25	idem.
San Francisco, (port)	37 48 30	134 57 0	8 19 48	Vancouver and Malaspina.
Cape Mendocino	40 29 0	126 48 45	8 27 15	Expedition of Malaspina.
Nutka, (port)	49 35 13	128 55 15	8 35 41	idem. (This position & the preceding are beyond the actual bounds of New Spain.
REVILLAGIGEDO ISLANDS.				
Isla de Santa Rosa, (centre)	18 37 0	116 23 45	7 54 33	Collnet, Camacho, & Torres (memoire of M. Espinosa.)
Isla del Socorro, (summit of the mountain which is more than 1115 metres high, or 3657 feet)	18 48 0	112 29 15	7 29 57	idem.
Rocca Partida	19 4 0	113 25 45	7 33 43	idem.
Isla de San Benedito, (south cape)	19 15 40	113 13 45	7 28 55	idem.

POSITIONS LESS CERTAIN.

Names of Places.	N. Latitude.	Longitude W. from Paris. In degrees.	In time.	Names of observers and remarks.
Guatulco, (port)	15° 44′ 0″	. . .	. . .	Pedro de Laguna.
Barra de Manialtepec	15 47 0	. . .	. . .	idem.
Pachutla, (village)	15 50 0	. . .	. . .	idem.
Xamiltepec, (village)	16 7 0	. . .	. . .	idem.
Guiechapa, (village)	15 25 0	. . .	. . .	idem.
Ometepec, (village)	16 37 0	. . .	. . .	idem.
Nochistlan, (village)	17 16 0	. . .	. . .	idem.
Teposcolula	17 18 0	. . .	. . .	idem.
San Antonio de los Cues, (village)	18 3 0	. . .	. . .	idem.
Guadalaxara, (city)	21 9 0	105° 22′ 30″	7h 1′ 30″	Mascaro and Rivera.
Zacatecas, (city)	23 0 0	103 55 0	6 55 40	Count de la Laguna.
Real del Rosario, (mine)	23 30 0	108 26 30	7 13 46	Mascaro and Rivera.
Durango, (city)	24 25 0	105 55 0	7 3 40	Oteyza.
Presidio del Passage	25 28 0	105 33 30	7 2 14	Mascaro and Rivera.
Villa del Fuerte	26 50 0	110 33 30	7 22 14	idem.
Real del los Alamos, (mine)	27 8 0	111 23 30	7 25 34	idem.
Presidio de Buenavista	27 45 0	112 28 30	7 29 45	idem.
Chihuahua, (city)	28 50 0	106 50 0	7 7 40	Mascaro and Lafora.

Names of Places.	N. Latitude.	Longitude W. from Paris. In degrees.	Longitude W. from Paris. In time.	Names of observers and remarks.
Arispe, (city)	30° 36′ 0″	111° 18′ 30″	7h 25′ 14″	Mascaro and Rivera.
Presidio de Janos	.. .. ..	109 5 30	7 16 22	Mascaro.
Presidio del Altar	31 2 0	114 6 0	7 36 24	Mascaro and Rivera.
Passo del Norte, (Presidio)	32 9 0	107 3 0	7 8 12	Mascaro.
Junction of the Rio Gila and Colorado	32 45 0	.. ....	.... ..	Fathers Diaz and Font.
Las Casas grandes (near Rio Gila)	33 30 0	.. ....	.. .. ..	Father Font.
Santa Fe, (city)	36 12 0	107 13 0	7 8 52	Lafora.

TABLE

Of the most remarkable elevations measured in the interior of New Spain.

The work published with the title of *Nivellement barométrique fait dans les Regions Equinoxiales du Nouveau Continent*, in 179 .—1804, contains more than two hundred points in the interior of New Spain, of which I determined the elevation above the level of the sea, either by the barometer, or by trigonometrical methods. We have merely inserted in the following table the absolute heights of the most remarkable mountains and cities. The points marked with an asterisk are doubtful. M. *Recueil d'observations astronomiques et de mesures barométriques* edited by M. Oltmanns may also be consulted, (vol. I. pages 318 to 334.)

Names of places of observation.	Height above the level of the sea, according to the formula of M. Laplace.		
	In metres.	In toises.	In Eng. feet.†
Volcan de Popocatepetl, volcan grande de Mexico ò de Puebla	5400	2771	17710
Pic d'Orizaba or Citlaltepetl	5295	2717	17371
Nevado d'Iztaccihuatl, Sierra Nevada of Mexico	4786	2456	15700
Nevado de Toluca, at the rock of Frailes	4621	2372	15159
Coffre de Perote or Nauhcampatepetl	4089	2098	13414
Cerro de Axusco, six leagues to the S.S.W. of Mexico	3674*	1885*	12052

†This column is added by the translator.

Names of places of observation.	Height above the level of the sea, according to the formula of M. Laplace.		
	In metres.	In toises.	In Eng. feet.
Pic de Tancitaro	3200*	1642	10498
El Jacal, summit of the Cerro de las Nabajas	3124	1603	10249
Mamanchota or Organos d'Actopan, N.E. from Mexico	2977	1527	9766
Volcan de Colima	2800*	1437	9186
Volcan de Jorullo, in the intendancy of Valladolid	1301	667	4267
Mexico, at the convent of St. Augustin	2277	1168	7470
Pachuca	2484	1274	8149
Moran, mine near the Real del Monte	2595	1331	8513
Real del Monte, mine	2781	1427	9057
Tula, city	2053	1053	6735
Toluca, city	2688	1379	8818
Cuernavaca, city	1656	849	5433
Tasco, city	1784	915	5852
Chilpansingo, city	1380	708	4527
Puebla de los Angeles, city	2194	1126	7198
Perote, town	2354	1208	7723
Xalapa, city	1321	678	4333
Valladolid, city	1952	1001	6404

Names of places of observation.	Height above the level of the sea, according to the formula of M. Laplace.		
	In metres.	In toises.	In Eng. feet.
Pazcuaro, city	2202	1130	7224
Charo, city	1907	978	6256
Villa de Islahuaca, in the intendancy of Valladolid	2585	1326	8481
San Juan del Rio, town	1978	1015	6489
Queretaro, city	1940	995	6364
Celaya, city	1835	941	6020
Salamanca, city	1757	902	5763
Guanaxuato, city	2084	1069	6836
Mine de la Valenciana	2328	1194	7637
Durango, city	2087*	1071	6847

END OF GEOGRAPHICAL INTRODUCTION.

POLITICAL ESSAY

ON THE

KINGDOM OF NEW SPAIN.

I ARRIVED at Mexico by the South Sea in March 1803, and resided a year in that vast kingdom. I had recently visited the province of Caraccas, the banks of the Oronooko, the Rio Negro, New Granada, Quito, and the coast of Peru; and I could not avoid being ſtruck with the contrast between the civilization of New Spain, and the scanty cultivation of those parts of South America which had fallen under my notice. This contrast excited me to a particular study of the statisticks of Mexico, and to an investigation of the causes which have had the greatest influence on the progress of the population and national industry.

My situation offered me every means for attaining this end. No printed work could furnish me

with materials, but I had at command a great number of manuscript memoirs, of which an active curiosity had spread copies through the most remote parts of the Spanish colonies. I compared the results of my own researches with those contained in the official papers which I had many years been collecting. A short, but interesting stay, which I made in 1804 at Philadelphia and Washington, enabled me also to draw comparisons between the actual ſtate of the United States and that of Peru and Mexico.

Thus my geographical and statistical materials swelled to too great a bulk to admit of entering their results in the historical account of my travels. I flattered myself with the hope that a particular work, under the title of Political Essay on the Kingdom of New Spain, might be received with interest at a time when the new continent more than ever attracts the attention of Europeans. Several copies of the first sketch of this work, which I drew up in Spanish, exist in Mexico, and in the peninsula. Believing that it might be useful to those called to the administration of the colonies, who often, after a long residence, have no precise idea of the state of those beautiful and extensive regions, I communicated my manuscript to all who desired to study it. From these reiterated communications I received many important corrections. Even the Spanish government honoured

my researches with a particular attention; and they have furnished materials for several official papers on the interests of the commerce and manufacturing industry of the colonies.

The work which I now publish is divided into six grand sections. The first book consists of general considerations on the extent and physical aspect of New Spain. Without entering into any detail of descriptive natural history (a detail reserved for other parts of my work) I have examined the influence of the inequalities of the soil on the climate, agriculture, commerce, and defence of the coasts. The second book treats of the general population and division of the casts. The third presents a particular statistical view of the intendancies, their population, and area, calculated from the maps drawn up by me from my astronomical observations. I discuss in the fourth book the state of agriculture, and of the metallic mines; and in the fifth, the progress of manufactures and commerce. The sixth book contains researches into the revenues of the state, and the military defence of the country.

Notwithstanding the extreme care which I bestowed in verifying the results, I have no doubt of having committed many very serious errors, which will be pointed out in proportion as my work shall excite the inhabitants of New Spain to study the state of their country. I rely, however, on the

indulgence of those who know the difficulties of researches of this nature, and who have compared together the statistical tables which annually appear in the most civilized countries of Europe.

BOOK I.

GENERAL CONSIDERATIONS ON THE EXTENT AND PHYSICAL ASPECT OF THE KINGDOM OF NEW SPAIN. INFLUENCE OF THE INEQUALITIES OF THE SOIL ON THE CLIMATE, AGRICULTURE, COMMERCE, AND MILITARY DEFENCE OF THE COUNTRY.

CHAPTER I.

Extent of the Spanish possessions in America. Comparison of these possessions with the English colonies, and with the Asiatic part of the Russian empire. Denominations of New Spain, and of Anahuac. Boundary of the empire of the Aztec kings.

BEFORE entering on a political view of the kingdom of *New Spain*, it may be of importance to bestow a rapid glance on the extent and population of the Spanish possessions in the two Americas. We must generalize our ideas, and consider each colony in its relations with the neighbouring colonies and with the mother country, if we would obtain accurate results, and assign to the country described the place to which it is entitled from its territorial wealth.

The Spanish possessions of the new continent occupy the immense extent of territory comprised

between the 41° 43′ of south latitude, and the 37° 48′ of north latitude. This space of seventy-nine degrees equals not only the length of all Africa, but it even much surpasses the breadth of the Russian empire, which includes about a hundred and sixty-seven degrees of longitude, under a parallel of which the degrees are not more than half the degrees of the equator.

The most southern point of the new continent inhabited by the Spaniards is fort *Maullin*, near the small village of *Carelmapu* *, on the coast of Chili, opposite to the northern extremity of the island of *Chiloe*. A road is opening from *Valdivia* to this fort of *Maullin;* a bold but useful undertaking, as a stormy sea prevents navigators for a great part of the year from landing on so dangerous a coast. On the south and south-east of fort *Maullin*, in the gulfs of *Ancud* and *Reloncavi*, by which we reach the great lakes of *Nahuelhapi* and *Todos los Santos*, there are no Spanish establishments; but we meet with them in the islands near the eastern coast of *Chiloe*, even in 43° 34′ of south latitude, where the island *Caylin* (opposite the lofty summit of the *Corcobado*) is inhabited by several families of Spanish origin

The most northern point of the Spanish colonies is the mission of *San Francisco*, on the coast of New California, seven leagues to the north-west of

* See note A, at the end of the work.

Santa Cruz. The Spanish language is thus spread over an extent of more than 1900 leagues in length. Under the wise administration of Count *Florida Blanca*, a regular communication of posts was established from *Paraguay* to the north-west coast of North America; and a monk in the mission of the *Guaranis* Indians can maintain a correspondence with another missionary inhabiting New Mexico, or the countries in the neighbourhood of Cape *Mendocin*, without their letters ever passing at any great distance from the continent of Spanish America.

The dominions of the king of Spain in America exceed in extent the vast regions possessed by the Russian empire, or Great Britain, in Asia. I thought, therefore, that a view of these differences and of the striking disproportion between the area and the population of the mother country, compared with those of the colonies, could hardly fail to be interesting. To make this disproportion appear still more palpable, I have formed, according to exact scales, the drawings in the last plate. A red parallelogram which serves for the base, represents the surface of the mother countries; and a blue parallelogram which reposes on the base, indicates the area of the Spanish and English possessions in America and Asia. These views, similar to those of M. Playfair, have something fearful in them, particularly when we fix our eyes on the grand catastrophe represented in the fourth

figure, of which the memory is still recent among us. This plate alone should suggest important considerations to those who superintend the prosperity and tranquillity of the colonies. The dread of a future evil is undoubtedly in itself a motive of no great dignity; but it is a powerful motive of vigilance and activity for great political bodies, as well as for simple individuals.

The Spanish possessions in America are divided into nine great governments, which may be regarded as independent of one another. Of these nine governments, five, viz. the viceroyalties of *Peru* and of *New Grenada*, the *capitanias generales* of *Guatimala*, of *Portorico*, and of *Caraccas*, are wholly comprised in the torrid zone; the four other divisions, viz. the viceroyalties of *Mexico* and *Buenos Ayres*, the *capitanias generales* of *Chili* and *Havannah*, including the Floridas, are composed of countries of which a great part is situated without the tropics, that is to say, in the temperate zone. We shall afterwards see that this position alone does not determine the nature of the productions of these fine regions. The union of several physical causes, such as the great height of the Cordilleras, their enormous masses, the number of plains, elevated more than from two to three thousand metres * above the level of the ocean, give to a part of the equinoxial regions a temperature

* From 6561 to 9842 feet. *Trans.*

adapted to the cultivation of the wheat and fruit trees of Europe. The geographical latitude has small influence on the fertility of a country, where, on the ridge and declivity of the mountains, nature exhibits a union of every climate.

Among the colonies subject to the king of Spain, Mexico occupies at present the first rank, both on account of its territorial wealth, and on account of its favourable position for commerce with Europe and Asia. We speak here merely of the political value of the country, considering it in its actual state of civilization, which is very superior to that of the other Spanish possessions. Many branches of agriculture have undoubtedly attained a higher degree of perfection in the province of Caraccas than in New Spain. The fewer mines a colony has, the more the industry of the inhabitants is turned towards the productions of the vegetable kingdom. The fertility of the soil is greater in the provinces of *Cumana*, of *New Barcelona*, and *Venezuela*; and it is greater on the banks of the lower Orinoco, and in the northern part of New Grenada, than in the kingdom of Mexico, of which several regions are barren, destitute of water, and incapable of vegetation. But on considering the greatness of the population of Mexico, the number of considerable cities in the proximity of one another, the enormous value of the metallic produce, and its influence on the commerce of Europe and Asia; in short, on ex-

amining the imperfect state of cultivation observable in the rest of Spanish America we are tempted to justify the preference which the court of Madrid has long manifested for Mexico above its other colonies.

The denomination of New Spain designates, in general, the vast extent of country over which the viceroy of Mexico exercises his power. Using the word in this sense, we are to consider as northern and southern limits the parallels of the 38th and 10th degrees of latitude. But the *captain-general* of Guatimala, considered as administrator, depends very little on the viceroy of New Spain. The kingdom of *Guatimala* contains, according to its political division, the governments of *Costa Rica* and of *Nicaragua*. It is conterminous with the kingdom of New Grenada, to which *Darien* and the isthmus of Panama belong. Whenever in the course of this work we use the denominations of *New Spain* and *Mexico*, we exclude the *captania-general* of *Guatimala*, a country extremely fertile, well peopled, compared with the rest of the Spanish possessions, and so much the better cultivated as the soil, convulsed by volcanos, contains almost no metallic mines. We consider the intendancies of *Merida* and *Oaxaca* as the most southern, and at the same time the most eastern parts of New Spain. The confines which separate Mexico from the kingdom of *Guatimala* are washed by the Great Ocean to the

east of the port of *Tehuantepec*, near *la Barra de Tonala*. They terminate on the shore of the Atlantic, near the bay of Honduras.

The name of *New Spain* was at first only given in the year 1518 to the province of *Yucatan*, where the companions in arms of Grijalva were astonished at the cultivation of the fields and the beauty of the Indian edifices. *Cortez*, in his first letter to the emperor Charles V. in 1520, employs the denomination of New Spain for the whole empire of *Montezuma*. This empire, if we may believe *Solis*, extended from *Panama* to *New California*. But we learn from the diligent researches of a Mexican historian, the abbé *Clavigero**, that *Montezuma* the sultan of *Tenochtitlan* had a much smaller extent of country under his dominion. His kingdom was bounded towards the eastern coast by the rivers of *Guasacualco* and *Tuspan*, and towards the western coast by the plains of *Soconusco*, and the port of *Zacatula*. On looking into my general map of New Spain, divided into intendancies, it will be found, that according to these limits, the empire of Montezuma included only the intendancies of *Vera Cruz*, *Oaxaca*, *la Puebla*, *Mexico*, and *Valladolid*. I think its area may be estimated at 15,000 square leagues.

Towards the beginning of the 16th century, the

* *Dissertazione sopra i confini di Anahuac.* See *Storia antica del Messico.* T. IV. p. 265.

river of *Santiago* separated the agricultural nations of *Mexico* and *Mechoacan* from the barbarous and pastoral hordes called *Otomites* and *Cicimecs*. These savages frequently carried their incursions as far as *Tula*, a town situated near the northern bank of the valley of *Tenochtitlan*. They occupied the plains of *Zelaya* and *Salamanca*, now admired for their fine cultivation, and the multitude of farms scattered over their surface.

Neither should the denomination of *Anahuac* be confounded with that of *New Spain*. Before the conquest all the country between the 14th and 21st degrees of latitude was included under the name of Anahuac. Besides the Aztec empire of Montezuma, the small republics of *Tlaxcallan* and *Cholollan*, the kingdoms of *Tezcuco* (or *Acolhoacan*) and *Mechuacan*, which comprised part of the intendancy of Valladolid, belonged to the ancient *Anahuac*.

Even the name *Mexico* is of Indian origin. It signifies in the *Aztec* language the habitation of the God of war, called *Mexitli* or *Huitzilopochtli*. It appears, however, that before the year 1530 the city was more commonly called *Tenochtitlan* than *Mexico*. *Cortez**, who had made very little progress in the language of the country, called the capital, through corruption,

* Historia de Nueva España, por Lorenzana (Mexico, 1770, p. 1.)

Temixtitan. These etymological observations will not be found too minute in a work which treats exclusively of the kingdom of Mexico. The audacious man who overturned the *Aztec* monarchy considered this kingdom sufficiently extensive to advise* Charles V. to unite the title of emperor of *New Spain* to that of Roman emperor.

We are tempted to compare together the extent and population of Mexico, and that of two empires with which this fine colony is in relations of union and rivalry. Spain is five times smaller than Mexico. Should no unforeseen misfortunes occur, we may reckon that in less than a century the population of New Spain will equal that of the mother country. The United States of North America since the cession of Louisiana, and since they recognize no other boundary than the *Rio-Bravo del Norte*, contain 240,000 square leagues. Their population is not much greater than that of Mexico, as we shall afterwards see on examining carefully the population and the area of New Spain.

If the political force of two states depended solely on the space which they occupy on the globe, and

* Cortez says, in his first letter, dated from Villa Segura de la Frontera, the 30th October, 1520: "Las cosas de esta terra son tantas y tales que Vuestra Alteza se puede entitular de nuevo Emperador de ella, y con titulo y non menos merito, que el de Alemaña, que por la gracia de Dios, Vuestra Sacra Mageatad possee." (Lorenzana, p. 38.)

on the number of their inhabitants; if the nature of the soil, the configuration of the coast; and if the climate, the energy of the nation, and above all the degree of perfection of its social institutions, were not the principal elements of this grand dynamical calculation, the kingdom of New Spain might, at present, be placed in opposition to the confederation of the American republics. Both labour under the inconvenience of an unequally distributed population; but that of the United States, though in a soil and climate less favoured by nature, augments with an infinitely greater rapidity. Neither does it comprehend, like the Mexican population, nearly two millions and a half of aborigines. These Indians, degraded by the despotism of the ancient *Aztec* sovereigns, and by the vexations of the first conquerors, though protected by the Spanish laws, wise and humane in general, enjoy very little, however, of this protection, from the great distance of the supreme authority. The kingdom of New Spain has one decided advantage over the United States. The number of slaves there, either Africans or of mixed race, is almost nothing; an advantage which the European colonists have only begun rightly to appretiate since the tragical events of the revolution of St. Domingo. So true it is, that the fear of physical evils acts more powerfully than moral considerations on the true interests of society, or the principles of philanthropy and of justice, so

often the theme of the parliament, the constituent assembly, and the works of the philosophers.

The number of African slaves in the United States amounts to more than a million, and constitute a sixth part of the whole population. The southern states, whose influence is increased since the acquisition of Louisiana, very inconsiderately increase the annual importation of these negroes It is not yet in the power of Congress, nor the chief of the confederation (a magistrate* whose name is dear to the true friends of humanity), to oppose this augmentation, and to spare by that means much distress to the generations to come.

* The present president, Mr. Thomas Jefferson, author of the excellent Essay on Virginia.

CHAPTER II.

Configuration of the coast.—Points where the two seas are least distant from one another.—General considerations on the possibility of uniting the South Sea and Atlantic Ocean.—Rivers of Peace and Tacoutche-Tesse.—Sources of the Rio Bravo and Rio Colorado.—Isthmus of Tehuantepec.—Lake of Nicaragua.—Isthmus of Panama.—Bay of Cupica.—Canal of Choco.—Rio Guallaga.—Gulf of St. George.

THE kingdom of New Spain, the most northern part of all Spanish America, extends from the 16th to the 38th degree of latitude. The length of this vast region in the direction of S.S.E. to N.N. W. is nearly 270 myriametres (or 610 common leagues); its greatest breadth is under the parallel of the 30th degree. From the *Red River* of the province of *Texas* (Rio-Colorado) to the isle of *Tiburon*, on the coast of the intendancy of *Sonora*, the breadth from east to west is 160 myriametres (or 364 leagues).

The part of Mexico in which the two oceans, the Atlantic and the South-Sea, approach the nearest to one another, is unfortunately not that part which contains the two ports of Acapulco and Vera Cruz, and the capital of Mexico. There are, according to my astronomical observations, from *Acapulco* to *Mexico* an oblique distance of

2° 40′ 19″, (or 155885 toises*); from Mexico to Vera Cruz 2° 57′ 9″ (or 158572 toises†); and from the port of Acapulco to the port of Vera Cruz, in a direct line, 4° 10′ 7″. It is in these distances that the old maps are most faulty. From the observations published by *M. de Cassini*, in the account of the voyage of Chappe, the distance from Mexico to Vera Cruz appears 5° 10′ of longitude, instead of 2° 57′, the real distance between these two great cities. In adopting for Vera Cruz the longitude given by Chappe, and for Acapulco that of the map of the *Depôt* drawn up in 1784, the breadth of the Mexican isthmus betwixt the two ports would be 175 leagues, 75 leagues beyond the truth.

The isthmus of Tehuantepec, to the S.E. of the port of *Vera Cruz*, is the point of New Spain in which the continent is narrowest. From the Atlantic Ocean to the South Sea the distance is 45 leagues. The approximation of the sources of the rivers *Huasacualco* and *Chimalapa* seems to favour the project of a canal for interior navigation; a project with which the Count of Revillagigedo, one of the most zealous viceroys for the public good, has been for a long time occupied. When we come to speak of the intendancy of Oaxaca, we shall return to this object, so important to all civilized Europe. We must confine our-

* 997664 feet. *Trans.* † 1014960 feet. *Trans.*

selves here to the *problem of the communication between the two seas*, in all the generality of which it is susceptible. We shall present in one view nine points, several of which are not sufficiently known in Europe, and all offer a greater or less probability either of canals or interior river communications. At a time when the New Continent, profiting by the misfortunes and perpetual dissentions of Europe, advances rapidly towards civilization; and when the commerce of China, and the north-west coast of America, becomes yearly of greater importance, the subject which we here summarily discuss is of the greatest interest for the *balance of commerce**, and the political preponderancy of nations.

These nine points, which at different times have fixed the attention of statesmen and merchants in the colonies, present very different advantages. We shall range them according to their geographical position, beginning with the most northern part of the New Continent, and following the coasts to the south of the island of *Chiloe*. It can only be after having examined *all* the projects hitherto formed for the communication of the two seas, that the government can decide which of

* It may be necessary to inform the reader, that he is indebted for this *term*, at present in some sort of disrepute from the proscription of political economists, however much the *idea* may still haunt the wise heads of our commercial men, to the author and not to me. *Trans.*

them merits the preference. Before this examination, exact materials for which are not yet collected, it would be imprudent to cut canals in the isthmuses of *Guasacualco* or *Panama*.

1. Under the 54° 37′ of north latitude, in the parallel of *Queen Charlotte's Island*, the sources of the river of Peace, or *Ounigigah*, approach to within seven leagues of the sources of the *Tacoutche Tesse*, supposed the same with the river of *Colombia*. The first of these rivers discharges itself into the Northern Ocean, after having mingled its waters with those of the *Slave Lake*, and the river Mackenzie. The second river, Colombia, enters the Pacific Ocean, near Cape *Disappointment*, to the south of Nootka Sound, according to the celebrated voyager Vancouver, under the 46° 19′ of latitude. The Cordillera, or chain of the *stony mountains*, abounding in coal, was found by M. *Fiedler* to be elevated in some places 3520 English feet*, or 550 toises above the neighbouring plains. It se-

* If it be true that this chain of mountains enters the region of perpetual snow (Mackenzie, vol. III. p. 331), their *absolute height* should be at least from 1000 to 1100 toises (from 6400 to 7040 English feet); from whence it would follow, either that the neighbouring plains, on which M. Fiedler was stationed to establish his measurements, are elevated from 450 to 550 toises above the level of the sea, or that the summits, of which this traveller indicates the height, are not the most elevated of the chain crossed by Mackenzie.

parates the sources of the rivers of *Peace* and Colombia. According to Mackenzie's account, who passed this Cordillera in the month of August, 1793, it is practicable enough for carriages, and the mountains appear of no very great elevation. To avoid the great winding of the Colombia, another communication still shorter might be opened from the sources of the *Tacoutche Tesse* to the Salmon river, the mouth of which is to the east of the *Princess Royal Islands*, in the 52° 26' of latitude. Mackenzie rightly observes, that the government which should open this communication between the two oceans, by forming regular establishments in the interior of the country, and at the extremities of the rivers, would get possession of the whole fur trade of North America, from the 48° of latitude to the pole, excepting a part of the coast which has been long included in Russian America. *Canada*, from the multitude and course of its rivers, presents facilities for internal commerce similar to those of *Oriental Siberia*. The mouth of the river Colombia seems to invite Europeans to found a fine colony there; for its banks afford fertile land in abundance covered with superb timber. It must be allowed, however, that notwithstanding the examination by Mr. Broughton, we still know but a very small part of Colombia, which, like the *Severn* and the *Thames*, appears of a disproportionate contraction

as it leaves the coast. Every geographer who carefully compares Mackenzie's maps with Vancouver's, will be astonished that the *Colombia* in descending from these *stony mountains*, which we cannot help considering as a prolongation of the *Andes* of Mexico, should traverse the chain of mountains which approach the shore of the Great Ocean, whose principal summits are Mount *St. Helen* and *Mount Rainier*. But M. *Malte-Brun* has started important doubts concerning the identity of the *Tacoutche Tesse* and the *Rio Colombia*. He even presumes that the former discharges itself into the gulf of California *; a bold supposition, which would give to the *Tacoutche Tesse* a course of an enormous length. It must be allowed that all that part of the west of North America is still but very imperfectly known.

In the 50° of latitude, the *Nelson* river, the *Saskashawan*, and the *Missoury*, which may be regarded as one of the principal branches of the *Mississippi*, furnish equal facilities of communication with the Pacific Ocean. All these rivers take their rise at the foot of the *Stony Mountains*. But we have not yet sufficient acquaintance with the nature of the ground through which the communication is proposed to be established, to pronounce upon the utility of these projects. The journey of Captain Lewis, at the expense of the

* Geogr. Mathem. vol. XV. p. 117.

Anglo-American government, on the Mississippi and the Missoury, may throw considerable light on this interesting problem.

2. Under the 40° of latitude, the sources of the *Rio del Norte*, or *Rio Bravo*, a considerable river which flows into the gulf of Mexico, are only separated from the sources of the *Rio Colorado* by a mountainous tract of from twelve to thirteen leagues of breadth. This tract is the continuation of the *Cordillera* of the *Cranes*, which stretches towards the *Sierra Verde* and the lake of *Timpanogos*, celebrated in the Mexican history. The *Rio S. Rafael* and the *Rio S. Xavier* are the principal sources of the river *Zaguananas*, which, with the *Rio de Nabajoa*, forms the *Rio Colorado*: the latter has its *embouchure* in the gulf of California. These regions, abounding in rock salt, were examined in 1777 by two travellers full of zeal and intrepidity, monks of the order of St. Francis, Father *Escalante* and Father *Antonio Velez*. But however interesting the *Rio Zaguananas* and the *Rio del Norte* may one day become for the internal commerce of this northern part of New Spain, and however easy the carriage may be across the mountains, no communication will ever result from it comparable to that opened directly from sea to sea.

3. The *isthmus* of *Tehuantepec* comprises, under the 16° of latitude, the sources of the *Rio Huasacualco*, which is discharged into the gulf of

Mexico, and the sources of the Rio de *Chimalapa*. The waters of this last river mix with those of the Pacific Ocean near the *Barra* de *S. Francisco*. I consider here the *Rio del Passo* as the principal source of the river *Huasacualco*, although the latter only takes its name at the *Passo de la Fabrica*, after one of its arms, which comes from the mountains *de los Mexes*, unites with the *Rio del Passo*. We shall examine afterwards the possibility of cutting a canal, of from six to seven leagues, in the forests of *Tarifa*. We shall merely observe here, that since, in 1798, a road has been opened which leads by land from the port of *Tehuantepec*, to the *Embarcadero de la Cruz* (a road completed in 1800); the *Rio Huasacualco* forms, in reality, a commercial communication between the two oceans. During the course of the war with the English, the indigo of *Guatimala*, the most precious of all known indigos, came by the way of this isthmus to the port of *Vera Cruz*, and from thence to Europe.

4. The great lake of *Nicaragua* communicates not only with the lake of *Leon*, but also on the east, by the river of *San Juan*, with the sea of the *Antilles*. The communication with the Pacific Ocean would be effected in cutting a canal across the isthmus which separates the lake from the gulf of *Papagayo*. On this strait isthmus are to be found the volcanic and isolated summits of *Bombacho* (at 11° 7′ of latitude), of Grenada, and of

the *Papagayo* (at 10° 50′ of latitude). The old maps point out a communication by water as existing across the isthmus from the lake to the Great Ocean. Other maps, somewhat newer, represent a river under the name of *Rio Partido*, which gives one of its branches to the Pacific Ocean, and the other to the lake of Nicaragua; but this divided stream does not appear on the last maps published by the Spaniards and English.

There are in the archives of Madrid several French and English memoirs*, on the possibility of the junction of the lake of Nicaragua with the Pacific Ocean. The commerce carried on by the English on the coast of *Mosquitos* has greatly contributed to give celebrity to this project of communication between the two seas. In none of the memoirs which have come to my knowledge is the principal point, the height of the ground in the isthmus, sufficiently cleared up.

From the kingdom of *New Grenada* to the environs of the capital of Mexico, there is not a single mountain, a single level, a single city, of which we know the elevation above the level of the sea. Does there exist an *uninterrupted* chain of mountains in the provinces of *Veragua* and *Nicaragua?*

* Memoire sur le passage de la mer du Sud a la mer du Nord, par M. la Bastide, en 1791. Voyage de Marchand, vol. i. p. 565. Mapa del Golfo de Mexico por Thomas Lopez y Juan de la Cruz, 1755.

Has this cordillera, which is supposed to unite the Andes of Peru to the mountains of Mexico, its *central chain* to the west or the east of the lake of *Nicaragua?* Would not the isthmus of *Papagayo* rather present a hilly tract than a continued cordillera? These are problems whose solution is equally interesting to the statesman and the geographical naturalist!

There is no spot on the globe so full of volcanos as this part of America, from the 11° or 13° of latitude; but do not these conical summits form groupes which, separately from one another, rise from the plain itself? We ought not to be astonished that we are ignorant of these very important facts; we shall soon see that even the height of the mountains which traverse the isthmus of Panama is not yet known. Perhaps the communication of the lake of Nicaragua with the Pacific Ocean could be carried on by the lake of *Leon*, by means of the river Tosta, which, on the road from *Leon* to *Realexo*, descends from the volcano of *Telica*. In fact, the ground appears there very little elevated. The account of the voyage of *Dampier* leads us even to suppose that there exists no *chain of mountains* between the lake of Nicaragua and the South Sea. "The coast of Nicoya," says this great navigator, "is low, and covered at full tide. To arrive from *Realexo* to Leon, we must go twenty miles across a country flat and covered with mangle trees." The

city of Leon itself is situated in a savanna. There is a small river which, passing near Realexo, might facilitate the communication between the latter port and that of Leon *. From the west bank of the lake of Nicaragua there are only four marine leagues to the bottom of the gulf of *Papagayo*, and seven to that of *Nicoya*, which navigators call *la Caldera*. Dampier says expressly that the ground between *la Caldera* and the lake is a little hilly, but for the greatest part level and like a savanna.

The coast of *Nicaragua* is almost inaccessible in the months of August, September and October, on account of the terrible storms and rains; in January and February, on account of the furious north-east and east-north-east winds called *Papagayos*. This circumstance is exceedingly inconvenient for navigation. The port of *Tehuantepec*, on the isthmus of *Guasacualco*, is not more favoured by nature; it gives its name to the hurricanes which blow from the north-west, and which frighten vessels from landing at the small ports of *Sabinas* and *Ventosa*.

5. The *isthmus* of *Panama* was crossed for the first time by *Vasco Nuñez de Balboa*, in 1513. Since this memorable epocha in the history of geographical discoveries, the project of a canal has

* Collection of Dampier's and Wafer's voyages, vol. i. p. 113, 119, 218.

occupied every mind; and yet at this day, after the lapse of 300 years, there neither exists a survey of the ground, nor an exact determination of the positions of *Panama* and *Portobello*. The longitude of the first of these two ports has been found with relation to Carthagena; the longitude of the second has been fixed from Guayaquil. The operations of *Fidalgo* and *Malaspina* are undoubtedly deserving of very great confidence; but errors are insensibly multiplied, when by chronometrical operations from the isle of *Trinidad* to Portobello, and from *Lima* to *Panama*, one position becomes dependant on another. It would be important to carry the time directly from *Panama* to *Portobello*, and thus to connect the operations in the South Sea with those which the Spanish government has carried on in the Atlantic Ocean. Perhaps MM. *Fidalgo*, *Tiscar*, and *Noguera*, may one day advance with their instruments to the southern coast of the isthmus, while MM. *Colmenares*, *Irasvirivill*, and Quartara, shall carry their operations * to the northern coast. To form an idea of the uncertainty which still

* These officers of the Spanish marine were charged with surveying the northern and western coasts of South America. The expedition of Fidalgo was destined for the coast situated between the isle of *Trinidad* and *Portobello*, the expedition of *Colmenares* for the coast of *Chili*, and the expedition of *Moraleda* and *Quartara* for the part between *Guayaquil* and *Realexo*.

prevails as to the form and breadth of the isthmus (for example towards *Nata*), we have only to compare the maps of Lopez with those of Arrowsmith, and with the more recent ones of the *Deposito Hydrografico* of Madrid. The river *Chagre*, which flows into the sea of the Antilles to the west of *Portobello*, presents, notwithstanding its sinuosities and its rapids, great facility for commerce; its breadth is 120 toises at its mouth, and 20 toises near *Cruces*, where it begins to be navigable. It requires four or five days at present to ascend the *Rio Chagre* from its mouth to *Cruces*. If the waters are very high, the current must be struggled with for ten or twelve days. From *Cruces* to Panama merchandizes are transported on the backs of mules, for a space of five small leagues. The barometrical heights related in the travels of Ulloa * lead me to suppose that there exists in the *Rio Chagre*, from the sea of the Antilles to the *Embarcadero*, or *Venta de Cruces*, a difference of level of from 35 to 40 toises. This must appear a very small difference to those who have ascended the *Rio Chagre*; they forget that the force of the current depends as much on a great accumulation of water near the sources, as on the general descent of the river; that is to say, of the descent of the *Rio Chagre* above *Cruces*. On comparing the barometrical survey of Ulloa

* Observations astronomiques d'Ulloa, p. 97.

with that made by myself in the river of *Magdelen*, we perceive that the elevation of *Cruces* above the ocean, far from being small, is, on the contrary, very considerable. The fall of the *Rio de la Madelena* from Honda to the dyke of *Mahates*, near *Barrancas*, is nearly 170 toises*; and this distance nevertheless is not as we might suppose four times, but eight times, greater than that of Cruces at the *fort* of *Chagre*.

The engineers in proposing to the court of Madrid that the river *Chagre* should serve for establishing a communication between the two oceans, have projected a canal from the *venta de Cruces* to *Panama*. This canal would have to pass through a hilly tract, of the height of which we are completely ignorant. We only know that, from Cruces, the ascent is at first rapid, and that there is then a descent for several hours towards the South Sea. It is very astonishing, that in crossing the isthmus neither *La Condamine* nor *Don George Juan* and *Ulloa* had the curiosity to observe their barometer, for the sake of informing us what is the height of the most elevated point on the route of the castle of *Chagre* at *Panama*. These illustrious *savans* sojourned three months in that interesting region for the commercial world; but their stay has added little to the old observations which we owe to *Dampier* and to *Wafer*. However, it appears beyond a doubt

* 1088 feet. *Trans.*

that we find the principal *Cordillera*, or rather a range of hills that may be regarded as a prolongation of the *Andes* of *New Grenada*, towards the South Sea, between *Cruces* and *Panama*. It is from thence that the two oceans are said to be discernible at the same time, which would only require an absolute height of 290 metres *. However, *Lionel Wafer* complains that he could not enjoy this interesting spectacle. He assures us, moreover, that the hill which form the central chain are separated from one another by vallies which allow *free course* for passage of the rivers †. If this last assertion be founded, we might believe in the possibility of a canal from *Cruces* to *Panama*, of which the navigation would only be interrupted by a very few locks.

There are other points where, according to memoirs drawn up in 1528, the isthmus has been proposed to be cut, for example in joining the sources of the rivers called *Caimito* and *Rio Grande*, with the *Rio Trinidad*. The eastern part of the isthmus is the narrowest, but the ground appears to be also most elevated there. This is at least what has been remarked in the frightful road travelled by the courier from Portobello to Panama,

* 947 English feet. *Trans.*

† Description of the isthmus of America, 1729, p. 207. Near the town of Panama, a little to the north of the port, is the mountain of *L'Ancon*, which, according to a geometrical measurement, is 191 toises (646 feet) in height. Ulloa, vol. i. p. 101.

a two days journey, which goes by the village of *Pequeni*, and is full of the greatest difficulties.

In every age and climate, of two neighbouring seas, the one has been considered as more elevated than the other. Traces of this vulgar opinion are to be found among the ancients. *Strabo* relates, that in his time the gulf of Corinth near *Lechaeum* was believed to be above the level of the sea of *Cenchreae*. He is of opinion* that it would be very dangerous to cut the isthmus of the Peloponesus in the place where the Corinthians, by means of particular machines, had established a *portage*. In America, the South Sea is generally supposed to be higher at the isthmus of Panama than the Atlantic ocean. After a struggle of several days against the current of the Rio Chagre, we naturally believe the ascent to be greater than the descent from the hills near *Cruces* to *Panama*. Nothing, in fact, can be more treacherous than the estimates which we are apt to form of the difference of level on a long and easy descent. I could hardly believe my own eyes at Peru, when I found, by means of a barometrical measurement, that the city of *Lima* was 91 toises† higher than the port of Callao. An earthquake must cover entirely the rock of the isle *San Lorenzo* with water before the

* Strabo, lib. I. ed. Siebenkees, v. I. p. 146. Livius, lib. 42. cap. 16.

† 582 feet. *Trans.*

ocean can reach the capital of Peru. The idea of a difference of level between the Atlantic and South Sea has been combated by *Don George Juan*, who found the height of the column of mercury the same at the mouth of the *Chagre* and at *Panama*.

The imperfection of the meteorological instruments then in use, and the want of every sort of thermometrical correction of the calculation of heights, might also give rise to doubts. These doubts have acquired additional force since the French engineers, in the expedition to Egypt, found the *Red Sea* six toises* higher than the *Mediterranean*. Till a geometrical survey be executed in the isthmus itself, we can only have recourse to barometrical measurements. Those made by me at the mouth of the *Rio Sinu* in the Atlantic Sea, and on the coast of the South Sea in Peru, prove, with every allowance for temperature, that if there is a difference of level between the two seas, it cannot exceed six or seven metres†.

When we consider the effect of the *current of rotation*‡, which carries the waters from east to west, and accumulates them towards the coast of *Costa Ricca* and *Veragua*, we are tempted to ad-

* 38 feet. *Trans.* † 19 or 22 feet. *Trans.*

‡ I call *current of rotation* the general motion from east to west, observed in the part of the ocean comprised in the torrid zone.

mit, contrary to the received opinion, that the Atlantic is a little higher than the South Sea. Trivial causes of a local nature, such as the configuration of the coast, currents and winds (as in the Straits of *Babelmandel*), may trouble the equilibrium which ought necessarily to exist between all the parts of the ocean. As the tides rise at Portobello to a third part of a metre *, and at Panama to four or five metres †, the levels of the two neighbouring seas ought to *vary* with the different *establishments of the ports*. But these trivial inequalities, far from obstructing hydraulical operations, would even be favourable for sluices.

We cannot doubt that if the isthmus of *Panama* were once burst by some similar catastrophe to that which opened the columns of Hercules ‡, the current of rotation in place of ascending towards the gulf of Mexico, and issuing through the canal of Bahama, would follow the same parallel from the coast of Paria to the Philippine islands. The effect of this opening, or new strait, would extend much beyond the banks of *Newfoundland*, and would either occasion the disappearance or diminish the celerity of the Hot-water river, known by the name of *Gulf-stream* §,

* 13 inches. *Trans.* † 13 or 16 feet. *Trans.*

‡ Diodorus Siculus, lib. iv. p. 226. lib. xvii. p. 533. edit. Rhodom.

§ The Gulf-stream, on which *Franklin* and afterwards

which leaving Florida on the north-east, flows in the 43° of latitude to the east, and especially the south-east towards the coast of Africa. Such would be the effects of an inundation analogous to that of which the memory has been preserved in the traditions of the *Samothracians*. But shall we dare to compare the pitiful works of man with canals cut by nature herself, with straits like the Hellespont and the Dardanelles!

Strabo * appears inclined to believe that the sea will one day open the isthmus of *Suez*. No such catastrophe can be expected in the isthmus of *Panama*, unless enormous volcanic convulsions, very improbable in the actual state of repose of our planet, should occasion extraordinary revolutions. A tongue of land lengthened out from east to west in a direction almost parallel to that of the current of rotation escapes, as it were, the shock of the waves. The isthmus of Panama would be seriously threatened, if it extended from south to

Williams, have left us such valuable observations, carries rapidly the tropical waters to the northern latitudes. It is occasioned by the current of rotation which strikes against the coasts of *Veragua* and *Honduras*, and ascending towards the gulf of Mexico, between Cape *Catoche* and Cape *St. Antoine*, issues through the canal of Bahama. It is owing to this motion that the vegetable productions of the Antilles are carried to Norway, Ireland, and the Canaries. See the second volume of my voyage to the tropics, chap. i.

* Strabo, ed. Siebenkees, T. I. p. 156.

north, and was situated between the port of *Carthago* and the mouth of the *Rio San Juan*, if the narrowest part of the new continent lay between the 10° and the 11° of latitude.

The navigation of the river *Chagre* is difficult, both on account of its sinuosities and the celerity of the current, frequently from one to two metres per second *. These sinuosities however afford a *counter current*, by means of which the small vessels called *bongos*, and *chatas*, ascend the river, either with oars, poles, or towing. Were these sinuosities to be cut, and the old bed of the river to be dried up, this advantage would cease, and it would be infinitely difficult to arrive from the North Sea to Cruces.

From all the information which I could procure relating to this isthmus, while I remained at *Carthagena* and *Guayaquil*, it appears to me, that the expectation of a canal of seven metres † in depth, and from twenty-two to twenty-eight metres ‡ in breadth, which, like a pass or a strait, should go from sea to sea, and admit the vessels which sail from Europe to the East Indies, ought to be completely abandoned. The elevation of the ground would force the engineer to have recourse either to subterraneous galleries, or to the system

* From 3.28 to 6.56 feet. *Trans.*

† 22 feet 11 inches. *Trans.*

‡ From 72 feet 2 inches, to 91 feet 10 inches. *Trans.*

of sluices; and the merchandizes destined to pass the isthmus of Panama could only therefore be transported in flat-bottomed boats unable to keep the sea. Entrepots at Panama and Porto bello would be requisite. Every nation which wished to trade in this way would be dependent on the masters of the isthmus and canal; and this would be a very great inconvenience for the vessels despatched from Europe. Supposing then that this canal were cut, the greatest number of these vessels would probably continue their voyage round *Cape Horn*. We see that the passage of the Sound is still frequented, notwithstanding the existence of the *Eyder* canal, which connects the ocean with the Baltic sea.

It would be otherwise with the productions of western America, or the goods sent from Europe to the coast of the Pacific Ocean. These goods would cross the isthmus at less expense, and with less danger, particularly in time of war, than in doubling the southern extremity of the new continent. In the present state of things, the carriage of three quintals on mule-back from *Panama* to *Portobello* costs from three to four piastres (from 12s. 6d. to 16s. 8d.) But the uncultivated state in which the government allows the isthmus to remain is such, that the carriage of the copper of Chili, the quinquina of Peru, and the 60 or 70,000 vanegas of cacao * annually exported

* A vanega weighs 110 Castilian pounds.

by Guayaquil, across this neck of land, requires many more beasts of burden than can be procured, so that the slow and expensive navigation round Cape Horn is preferred.

In 1802 and 1803, when the Spanish commerce was every where harassed by the English cruizers, a great part of the cacao was carried across the kingdom of New Spain, and embarked at *Vera Cruz* for Cadiz. They preferred the passage from *Guayaquil* to *Acapulco*, and a land journey of a hundred leagues from *Acapulco* to *Vera Cruz*, to the danger of a long navigation by Cape Horn, and the difficulty of struggling with the current along the coasts of Peru and Chili. This example proves, that, if the construction of a canal across the isthmus of Panama, or that of Guasacualco, abounds with too many difficulties from the multiplicity of sluices, the commerce of America would gain the most important advantages from good causeways, carried from *Tehuantepec* to the *Embarcadero de la Cruz*, and from *Panama* to *Portobello*. It is true that in the isthmus, the pasturage * to this day is very unfavourable to the nourishment and multiplication of cattle; but it would be easy, in so fertile a soil, to form savannas by cutting down forests, or to cultivate the

* The assertion of Raynal (T. IV. p. 150) that domestic animals transported to Portobello lose their fecundity, should be considered as totally destitute of truth.

paspalum purpureum, the *milium nigricans*, and particularly the *medicago sativa*, which grows abundantly in Peru in the warmest districts. The introduction of camels would be still a surer means of diminishing the expense of carriage. These *land ships*, as they are called by the orientals, hitherto exist only in the province of *Caracas*, and were brought there from the Canary islands by the Marquis de Toro.

Moreover, no political consideration should oppose the progress of population, agriculture, commerce and civilization, in the isthmus of Panama. The more this neck of land shall be cultivated, the more resistance will it oppose to the enemies of the Spanish government. The events which took place at *Buenos Ayres* prove the advantages of a concentrated population in the case of an invasion. If any enterprising nation wished to become possessed of the isthmus, it could do so with the greatest ease at present, when good and numerous fortifications are destitute of arms to defend them. The unhealthiness of the climate, though now much diminished at Portobello, would alone oppose great obstacles to any military undertaking in the isthmus. It is from *St. Charles de Chiloe*, and not from Panama, that Peru can be attacked. It requires from three to five months to ascend from Panama to Lima. But the whale and *cachalot* fishery, which in 1803 drew 60 English vessels to the South Sea, and

the facilities for the Chinese commerce and the furs of Nootka Sound, are baits of a very seductive nature. They will draw, sooner or later, the masters of the ocean to a point of the globe destined by nature to change the face of the commercial system of nations.

6. To the south-east of *Panama*, following the coast of the Pacific Ocean, from Cape *S. Miguel* to Cape *Corientes*, we find the small port and bay of Cupica. The name of this bay has acquired celebrity in the kingdom of *New Grenada*, on account of a new plan of communication between the two seas. From *Cupica*, we cross, for five or six marine leagues, a soil quite level and proper for a canal, which would terminate at the *Embarcadero* of the *Rio Naipi*. This last river is navigable, and flows below the village of *Zitara* into the great *Rio Atrato*, which itself enters the Atlantic Sea. A very intelligent Biscayan pilot, M. Gogueneche, was the first who had the merit of turning the attention of government to the bay of Cupica, which ought to be for the new continent what Suez was formerly for Asia. M. Gogueneche proposed to transport the cacao of *Guayaquil*, by the *Rio Naipi* to *Carthagena*. The same way offers the advantage of a very quick communication between *Cadiz* and *Lima*. Instead of despatching couriers by *Carthagena*, *Santa Fe*, and *Quito*, or by *Buenos Ayres* and *Mendoza*, good quick sailing packet-boats should

be sent from *Cupica* to *Peru*. If this plan were carried into execution, the viceroy of Lima would have no longer to wait five or six months for the orders of his court. Besides, the environs of the *Bay of Cupica* abounds with excellent timber fit to be carried to Lima. We might almost say that the ground between *Cupica* and the mouth of the *Atrato* is the only part of all America in which the *chain of the Andes* is entirely broken.

7. In the interior of the province of *Choco*, the small ravine (Quebrada) *de la Raspadura*, unites the neighbouring sources of the *Rio* de *Noanama*, called also *Rio San Juan*, and the small river *Quito*. The latter, the *Rio Andageda* and the *Rio Zitara*, form the *Rio d'Atrato* which discharges itself into the Atlantic Ocean, while the *Rio San Juan* flows into the South Sea. A monk of great activity, *curé* of the village of *Novita*, employed his parishioners to dig a small canal in the ravine *de la Raspadura*, by means of which, when the rains are abundant, canoes loaded with cacao *pass from sea to sea*. This interior communication has existed since 1788, unknown in Europe. The small canal of Raspadura unites, on the coasts of the two oceans, two points 75 leagues distant from one another.

8. In the 10° of south latitude, two or three days journey from Lima, we reach the banks of the *Rio Guallaga* (or Huallaga), by which we

may without doubling Cape Horn arrive at the banks of the *grand Para* in Brazil. The sources even of the Rio Huanuco * which runs into the *Guallaga*, are only four or five leagues distant from the source of the *Rio Huaura*, which flows into the Pacific Ocean. The *Rio Xauxa*, also, which contributes to form the *Apuremac* and the *Ucayale*, has its rise near the source of the *Rio Rimac*. The height of the Cordillera, and the nature of the ground, render the execution of a canal impossible; but the construction of a commodious road, from the capital of Peru to the *Rio de Huanaco*, would facilitate the transport of goods to Europe. The great rivers *Ucayale* and *Guallaga* would carry in five or six weeks the productions of Peru to the mouth of the *Amazons*, and to the neighbouring coasts of Europe, while a passage of four months is requisite to convey the same goods to the same point, in doubling Cape Horn. The cultivation of the fine regions situated on the *eastern declivity* of the Andes, and the prosperity and wealth of their inhabitants, depend on a *free* navigation of the river

* See the maps given by Father *Sobreviela*, in the third volume of an excellent literary journal published at Lima, under the title of *Mercurio Peruviano*. The work of Skinner, on Peru, is an extract from this journal, of which some volumes, unfortunately not the most interesting, have found their way to London. I deposited the whole work in the king's library, at Berlin.

of the Amazons. This liberty, denied by the court of Portugal to the Spaniards, might have been acquired in the sequel to the events which preceded the peace of 1801.

9. Before the *coast of the Patagonians* was sufficiently known, the *Gulf of St. George*, situated between the 45° and the 47° of south latitude, was supposed to enter so far into the interior of the country, as to communicate with the arms of the sea which interrupt the continuity of the western coast, that is to say, with the coast opposite to the archipelago of *Chayamapu*. Were this supposition founded on solid bases, the vessels destined for the South Sea might cross South America 7° to the north of the Straits of *Magellan*, and shorten their route more than 700 leagues. In this way, navigators might avoid the dangers which, notwithstanding the perfection of nautical science, still accompany the voyage round Cape Horn and along the Patagonian coast, from Cape *Pilares* to the parallel of the *Chonos* islands. These ideas, in 1790, occupied the attention of the court of Madrid. *M. Gil Lemos*, viceroy of Peru, an upright and zealous administrator, equipped a small expedition under the orders of *M. Moraleda* *, to

* Don Jose de Moraleda y Montero visited the archipelagos of Chiloe and Chonos, and the western coast of the Patagonians, from 1787 down to 1796. Two very interesting manuscripts, drawn up by M. Moraleda, are to be found in the archives of the viceroyalty of Lima: the title of the one is,

examine the southern coast of Chili. I saw the instructions that he received at Lima, which recommended to him the greatest secrecy in case he should be happy enough to discover a *communication between the two seas*. But M. Moraleda discovered in 1793, that the *Estero de* Aysen, visited before him in 1763 by the Jesuits, fathers *Jose Garcia* and *Juan Vicuña*, was of all the arms of the sea that in which the waters of the ocean advance the farthest towards the east. Yet it is but eight leagues in length, and terminates at the isle *de la Cruz*, where it receives a small river, near a hot spring. Hence the canal of Aysen, situated in the 45° 28′ of latitude, is still 88 leagues distant from the Gulf of St. George. This gulf was exactly surveyed by the expedition of Malaspina. In the year 1746 a communication was, in the same manner, suspected in Europe between the bay of *St. Julien* (latitude 50° 53′) and the Great Ocean.

I have sketched in one plate the nine points which appear to afford means of communication between

Viage al Reconocimiento de los Islos de Chiloe, 1786; the other comprehends the *Reconocimiento del Archipelago de los Chonos y Costa occidental Patagonica*, 1792—1796. Curious and interesting extracts might be published from these journals, which contain details regarding the cities de los Cesares and de l'Arguello, which are said to have been founded in 1554, and are placed by apocryphal accounts between 42° and 49° of south latitude.

the two oceans, by the junction of neighbouring rivers, either by canals or carriage-roads between the places where the rivers become navigable. These sketches are not of equal accuracy, astronomically considered; but I wished to save the reader the labour of seeking in several maps what may be contained in one; and it is the duty of the government which possesses the finest and most fertile part of the globe to perfect what I have merely hinted at in this discussion. Two Spanish engineers, MM. *Le Maur*, drew up superb plans of the canal *de los Guines*, projected for traversing the whole island of *Cuba*, from *Batabano* to the *Havannah*. A similar survey of the isthmus of *Guasacualco*, the lake Nicaragua, of the country between *Cruces* and *Panama*, and between *Cupica* and the *Rio Naipi*, would direct the statesman in his choice, and enable him to decide, if it is at Mexico or Darien that this undertaking should be executed; an undertaking calculated to immortalize a government occupied with the true interests of humanity.

The long circumnavigation of South America would then be less frequent; and a communication would be opened for the goods which pass from the Atlantic Ocean to the South Sea. The time is past * "when Spain, through a jealous policy,

* M. de *Fleurieu*, in his learned notes on the *Voyage de Marchand*. T. I. p. 566.

refused to other nations a thoroughfare through the possessions of which she so long kept the world in ignorance." Those who are at present at the head of the government are enlightened enough to give a favourable reception to the liberal ideas proposed to them; and the presence of a stranger is no longer regarded as a danger for the country.

Should a canal of communication be opened between the two oceans, the productions of *Nootka Sound* and of *China* will be brought more than 2000 leagues nearer to Europe and the United States. Then only can any great changes be effected in the political state of *Eastern Asia*, for this neck of land, the barrier against the waves of the Atlantic Ocean, has been for many ages the bulwark of the independence of *China* and *Japan*.

CHAPTER III.

Physical aspect of the kingdom of New Spain compared with that of Europe and South America.—Inequalities of the soil.—Influence of these inequalities on the climate, cultivation, and military defence of the country.—State of the coasts.

We have hitherto considered the vast extent and the boundaries of the kingdom of New Spain. We have examined its relations with the other Spanish possessions, and the advantages which the configuration of its coasts afford for communications between the Atlantic and the South Seas. Let us now give a physical view of the country; and consider for a while the inequalities of its soil, and the influence of that inequality on the climate, cultivation, and military defence of Mexico. We shall merely exhibit general results. The details of natural history are foreign to statistics; but we cannot form an exact idea of the territorial wealth of a state, without knowing the structure of its mountains, the height of the great interior plains, and the temperature proper for those regions, in which the climates succeed, as it were, by strata, one above another.

When we take a general view of the whole surface of Mexico, we see that one half is situated under the burning sky of the tropics, and the other belongs to the temperate zone. The latter

contains 60,000 square leagues, and comprehends the *provincias internas*, both those which are under the immediate administration of the viceroy of Mexico (for example, the new kingdom of Leon, and the province of New Santander), and those governed by a particular commandant-general. The influence of this commandant extends over the intendancies of Durango and Sonora, and the provinces of Cohahuila, Texas, and New Mexico, regions thinly inhabited, which go all under the designation of *provincias internas de la commendancia general*, to distinguish them from the *provincias internas del vireynato*.

On the one hand, small portions of the northern provinces of Sonora and New Santander pass the tropic of Cancer; and on the other, the southern intendancies of Guadalaxara, Zacatecas, and S. Luis de Potosi (particularly the environs of the celebrated mines of Catorce) extend a little to the north of this limit*. We know, however, that the physical climate of a country does not altogether depend on its distance from the pole, but also on its elevation above the level of the sea, proximity to the ocean, configuration, and a great number of other local circumstances. Hence, of

* There is an oversight in the original in this place; for the fact is literally the reverse. The northern provinces of Sonora and New Santander stretch as far north as 38°, and part of the southern intendancies of Guadalaxara, Zacatecas, and S. Luis de Potosi, lie south of the tropic of Cancer. *Trans.*

the 50,000 square leagues situated in the torrid zone, more than three-fifths enjoy rather a cold or temperate than a burning climate. The whole interior of the viceroyalty of Mexico, especially the interior of the countries comprized under the antient denominations of Anahuac and Mechoacan, probably even all New Biscay, form an immense plain elevated 2000 or 2500 metres * above the level of the neighbouring seas.

There is scarcely a point on the globe where the mountains exhibit so extraordinary a construction as in New Spain. In Europe, Switzerland, Savoy, and the Tyrol, are considered very elevated countries; but this opinion is merely founded on the aspect of the groups of a great number of summits perpetually covered with snow, and disposed in parallel chains to the great central chain. Thus the summits of the Alps rise to 3900 and even 4700 metres †, while the neighbouring plains in the canton of Berne are not more than from 400 to 600 ‡ feet in height. The former of these numbers (400), a very moderate elevation, may be considered as that of the most part of plains of any considerable extent in Suabia, Bavaria, and New Silesia, near the sources of the Wartha and Piliza. In Spain, the two Castilles are elevated more than 580 metres (300 toises) §. The highest level in

* 6561 and 8201 feet. *Trans.*

† 12794 and 15419 feet. *Trans.*

‡ 1312 and 1968 feet. *Trans.* § 1902 feet. *Trans.*

France is Auvergne, on which the Mont d'Or, the Cantal, and the Puy de Dôme repose. The elevation of this level, according to the observations of M. de Buch, is 720 metres (370 toises) *. These examples serve to prove that in general the elevated surfaces of Europe which exhibit the aspect of plains, are seldom more than from 100 to 800 metres † (200 to 400 toises) higher than the level of the ocean.

In Africa, perhaps, near the sources of the Nile ‡, and in Asia, under the 34° and 37° of north latitude, there are plains analogous to those of Mexico; but the travellers who have visited Asia have left us completely ignorant of the elevation of Thibet. The elevation of the great desert of Cobi, to the north-west of China, exceeds, according to Father Duhalde, 1400 metres §. Colonel Gordon assured M. Labillardiere, that from the Cape of Good Hope to the 2 ° of south latitude the soil of Africa rose gradually to 2000 metres ‖ of elevation ¶. This fact, as new as it is curious, has not been confirmed by other naturalists.

The chain of mountains which form the vast

* 2360 feet. *Trans.* † From 1312 to 2624 feet. *Trans.*

‡ According to Bruce (vol. iii. p. 642, 652, and 712), the sources of the Nile, in Gogam, are more than 3200 metres (10,500 feet) higher than the level of the Mediterranean.

§ 5511 feet. *Trans.* ‖ 6561 feet. *Trans.*

¶ Labillardiere, t. i. p. 89.

plain of Mexico is the same with what, under the name of the Andes, runs through all South America; but the construction, I may say the skeleton, (Charpente) of this chain varies to the south and north of the equator. In the southern hemisphere, the Cordillera is every where torn and interrupted by crevices like open furrows not filled with heterogeneous substances. If there are plains elevated from 2700 to 3000 metres * (1400 to 1500 toises), as in the kingdom of Quito, and farther north in the province of los Pastos, they are not to be compared in extent with those of New Spain, and are rather to be considered as longitudinal vallies bounded by two branches of the great Cordillera of the Andes: while in Mexico it is the very ridge of the mountains which forms the plain, and it is the direction of the plain which designates as it were that of the whole chain. In Peru, the most elevated summits constitute the crest of the Andes; but in Mexico these same summits, less colossal it is true, but still from 4900 to 5400 † metres in height (2500 to 2770 toises), are either dispersed on the plain, or ranged in lines which bear no relation of parallelism with the direction of the Cordillera. Peru and the kingdom of New Grenada contain transversal vallies, of which the perpendicular depth is sometimes 1400 ‡ metres. The existence of these vallies prevents the inhabitants from tra-

* From 10629 to 11811 feet. *Trans.*

† From 16075 to 17715 feet. *Trans.* ‡ 4854 feet. *Trans.*

velling except on horseback, a-foot, or carried on the shoulders of Indians (called *cargadores*); but in the kingdom of New Spain carriages roll on to Santa Fe in the province of New Mexico, for a length of more than 1000 kilometres or 500 leagues. On the whole of this road there were few difficulties for art to surmount.

The table-land of Mexico is in general so little interrupted by vallies, and its declivity is so gentle, that as far as the city of Durango, in New Biscay, 140 leagues from Mexico, the surface is continually elevated from 1700 to 2700* metres above the level of the neighbouring ocean. This is equal to the height of Mount Cenis, St. Gothard, or the Great St. Bernard. That I might examine this geological phenomenon with the attention which it deserves, I executed five barometrical surveys. The first was across the kingdom of New Spain, from the South Sea to the Mexican Gulf, from Acapulco to Mexico, and from Mexico to Vera Cruz. The second survey extended from Mexico by Tula, Queretaro, and Salamanca to Guanaxuato. The third comprehended the intendancy of Valladolid, from Guanaxuato to the volcano of Jorullo at Pascuaro. The fourth extended from Valladolid to Toluca, and from thence to Mexico. Lastly, the fifth included the environs of Moran and Actopan. The number of points of which I determined the height,

* From 5576 to 8856 feet. *Trans.*

either barometrically or trigonometrically, amounts to 208; and they are all distributed over a surface comprehended between the 16° 50′ and 21° 0′ of north latitude, and the 102° 8′ and 98° 28′ of west longitude from Paris. Beyond these limits I know but of one place of which the length was accurately ascertained, and that is the city of Durango, elevated, according to a deduction from a mean barometrical altitude, 2000 * metres above the level of the sea. Thus the table-land of Mexico preserves its extraordinary elevation much farther north than the tropic of Cancer.

These measurements of heights, with the astronomical observations which I made on the same extent of ground, have enabled me to construct the physical maps which accompany this work. They contain a series of vertical sections. I have endeavoured to represent whole regions by a method which has hitherto been only employed for mines, or small portions of ground through which canals are intended to pass. In the statistics of the kingdom of New Spain, we must confine ourselves to plans likely to attract interest from views of political economy. The physiognomy of a country, grouping of mountains, extent of plains, elevation which determines its temperature; in short, whatever constitutes the construction of the globe, has the most essential influence on the pro-

* 6561 feet. *Trans.*

gress of population and welfare of the inhabitants. It influences the state of agriculture, which must vary with the difference of climate, the means of internal commerce, the communications which depend on the nature of the territory, and the military defence on which the external security of the colony depends. In these relations alone extensive geological views can interest the statesman, when he calculates the force and territorial wealth of a nation.

In South America, the Cordillera of the Andes exhibits at immense heights plains completely level. Such is the plain of 2565 * metres elevation on which the city of Santa Fe de Bogota is built. Wheat, potatoes, and *chenopodium quinoa*, are there carefully cultivated. Such is also the plain of Caxamarca, in Peru, the ancient residence of the unfortunate Atahualpa, of 2750 † metres elevation. The great plains of Antisana, in the middle of which rises the part of the volcano which penetrates the region of perpetual snow, are 4100 ‡ metres higher than the level of the ocean. These plains exceed in length the summit of the Pic of Teneriffe by 389 § metres; and yet they are so level, that at the aspect of their natal soil, those who inhabit these countries have no suspicion of the extraordinary situation in which nature has placed them. But all the plains of New Grenada,

* 8413 feet. *Trans.*
† 9021 feet. *Trans.*
‡ 13451 feet. *Trans.*
§ 1541 feet. *Trans.*

Quito, or Peru, do not exceed forty square leagues. Of difficult access, and separated from one another by profound vallies, they are very unfavourable for the transport of goods and internal commerce. Crowning insulated summits, they form as it were islots * in the middle of the aerial ocean. Those who inhabit these frozen plains remain concentrated there, and dread to descend into the neighbouring regions, where a suffocating heat prevails prejudicial to the primitive inhabitants of the higher Andes.

In Mexico, however, the soil assumes a different aspect. Plains of a great extent, but of a surface no less uniform, are so approximated to one another, that they form but a single plain on the lengthened ridge of the Cordillera; such is the plain which runs from the 18° to the 40° of north latitude. Its length is equal to the distance from Lyons to the tropic of Cancer, which traverses the great African desert. This extraordinary plain appears to decline insensibly towards the north. No measurement, as we have already remarked, was ever made in New Spain beyond the city of Durango; but travellers observe that the ground lowers visibly towards New Mexico, and towards the sources of the Rio Colorado. Three sections accompany this essay, one longitudinal and directed from south to north: it re-

* Small islands.

presents the ridge of the mountains in their prolongation towards the Rio Bravo. The two others are transversal sections from the coast of the Pacific Ocean to the Gulf of Mexico. All three show at a glance the difficulty which the extraordinary configuration of the country opposes to the transport of productions from the interior to the commercial cities of the coast.

In travelling from the capital of Mexico to the great mines of Guanaxuato, we remain at first for ten leagues in the valley of Tenochtitlan, elevated 2277 * metres above the level of the sea. The level of this beautiful valley is so uniform, that the village of Gueguetoque, situated at the foot of the mountain of Sincoque, is only ten † metres higher than Mexico. The hill of Barientos is merely a promontory which stretches into the valley. From Gueguetoque we ascend near Botas to Puerto de los Reyes, and from thence descend into the valley of Tula, which is 115 metres (222 toises) ‡ lower than the valley of Tenochtitlan, and across which the great canal of evacuation of the lakes San Christoval and Zumpango passes to the Rio de Moctezuma and the Gulf of Mexico. To arrive at the bottom of the valley of Tula, in the great plain of Queretaro, we must pass the mountain of Calpu-

* 7468 feet. *Trans.* † 22.8 feet. *Trans.*

‡ Here there is evidently a mistake, for 115 metres do not correspond to 222 toises; the value of the first is 376 feet, and of the latter 1420 feet. *Trans.*

lalpan, which is only 1379 metres * (2686 toises †) above the level of the sea, and is consequently less elevated than the city of Quito, though it appears the highest point of the whole road from Mexico to Chihuahua. To the north of this mountainous country the vast plains of S. Juan del Rio, Queretaro, and Zelaya begin, plains covered with villages and considerable cities. Their mean height equals Puy de Dôme in Auvergne, and they are near thirty leagues in length, extending to the foot of the metaliferous mountains of Guanaxuato. Those who have travelled into New Mexico assert that the rest of the way resembles what I have described and represented in a particular section. Immense plains, appearing like so many basins of old dried up lakes, follow one another, and are only separated by hills which hardly rise 200 or 250 ‡ metres at most above the bottom of these basons. I shall exhibit in another work (in the Atlas to the historical account of my travels) the section of the four plains which surround the capital of Mexico. The first, which comprehends the valley of Toluca, 2600 § metres (1340 toises); the second, or the valley of Tenochtitlan, 2274 ‖

* 4522 feet. *Trans.*

† This number, which does not correspond with the metres, should evidently be 686. *Trans.*

‡ 656 or 820 feet. *Trans.*

§ 8529 feet. *Trans.*

‖ 7459 feet. *Trans.*

metres (1168 toises); the third, or the valley of Actopan, 1966 * metres (1009 toises); and the fourth, the valley of Istla, 981 † metres (504 toises) of elevation. These four basins differ as much in their climate as in their elevation above the level of the sea; each exhibits a different cultivation: the first, and least elevated, is adapted for the cultivation of sugar; the second, cotton; the third, for European grain; and the fourth, for agava plantations, which may be considered as the vineyards of the Aztec Indians.

The barometrical survey which I executed from Mexico to Guanaxato proves how much the configuration of the soil is favourable in New Spain for the transport of goods, navigation, and even the construction of canals. It is different in the transversal sections from the Atlantic to the South Sea. These sections show the difficulties opposed by nature to the communication between the interior of the kingdom and the coast. They every where exhibit an enormous difference of level and temperature, while from Mexico to New Biscay the plain preserves an equal elevation, and consequently a climate rather cold than temperate. From the capital of Mexico to Vera Cruz, the descent is shorter and more rapid than from the same point to Acapulco. We might almost say, that the country has a better military defence from na-

* 6447 feet. *Trans.* † 3247 feet. *Trans.*

ture against the people of Europe than against the atttack of an Asiatic enemy; but the constancy of the trade winds, and the great current of rotation which never ceases between the tropics, almost annihilate every political influence which China, Japan, or Asiatic Russia in the succession of ages might wish to exercise over the New Continent.

Taking our direction from the capital of Mexico towards the east in the road to Vera Cruz, we must advance sixty marine leagues before arriving at a valley, of which the bottom is less than 1000* metres (500 toises) higher than the level of the sea, and in which, consequently, oaks cease to grow. In the Acapulco road, descending from Mexico towards the South Sea, we arrive at the same temperate regions in less than seventeen leagues. The eastern declivity of the Cordillera is so rapid, that when once we begin to descend from the great central plain, we continue the descent till we arrive at the eastern coast.

The western coast is furrowed by four very remarkable longitudinal vallies, so regularly disposed, that those which are nearest the ocean are even deeper than those more remote from it. Casting our eyes on the section drawn up by me from exact measurements, we shall observe, that from the plain of Tenochtitlan the traveller first descends into the valley of Istla, then into that of

* 3280 feet. *Trans.*

Mascala, then into that of Papagallo, and lastly, into the valley of Peregrino. The bottom of these four basins rise 981, 514, 170, and 158 metres* (504, 265, 98, and 82 toises) above the level of the ocean. The deepest are also the narrowest. A curve drawn over the mountains which separate these vallies, over the Pic of the Marquis (the old camp of Cortes), the summits of Tasco, Chilpansingo, and Posquelitos, would preserve an equally regular progress. We might even be tempted to believe that this regularity is conformable to the type generally followed by nature in the construction of mountains; but the aspect of the Andes of South America will soon destroy these systematic delusions. Many geological considerations prove to us, that at the formation of mountains, causes apparently very trivial have determined the accumulation of matter in colossal summits, sometimes towards the *centre*, and sometimes on the *edges* of the Cordilleras.

Thus the Asiatic road differs very much from the European. For the space of 72,5 leagues, the distance in a straight line from Mexico to Acapulco, we continually ascend and descend, and arrive every instant from a cold climate in regions excessively hot. Yet the road of Acapulco may be made fit for carriages. On the contrary, of the 84,5 leagues from the capital to the port of

* 3217, 1685, 557, and 518 feet. *Trans*

Vera Cruz, 140* belong to the great plain of Anahuac. The rest of the road is a laborious and continued descent, particularly from the small fortress of Perote to the city of Xalappa, and from this site, one of the most beautiful and picturesque in the known world, to la Rinconada. It is the difficulty of this descent which raises the carriage of flour from Mexico to Vera Cruz, and prevents it to this day from competing in Europe with the flour of Philadelphia. There is actually at present constructing a superb causeway along this eastern descent of the Cordillera. This work, due to the great and praiseworthy activity of the merchants of Vera Cruz, will have the most decided influence on the prosperity of the inhabitants of the whole kingdom of New Spain. The places of thousands of mules will be supplied by carriages fit to transport merchandises from sea to sea, which will connect, as it were, the Asiatic commerce of Acapulco with the European commerce of Vera Cruz.

We have already stated that in the Mexican provinces situated in the torrid zone, a space of 23,000 square leagues enjoys a cold, rather than a temperate climate. All this great extent of country is traversed by the Cordillera of Mexico, a chain of colossal mountains which may be considered as a prolongation of the Andes of Peru. Notwith-

* Here is evidently a mistake, 140 cannot be a part of 84,5. *Trans.*

standing their lowness in Choco, and the province of Darien, the Andes traverse the isthmus of Panama, and recover a considerable height in the kingdom of Guatimala. Sometimes their crest approaches the Pacific Ocean, at other times it occupies the centre of the country, and sometimes it approaches the gulf of Mexico. In the kingdom of Guatimala, for example, this crest, jagged with volcanic cones, runs along the western coast from the lake of Nicaragua towards the bay of Tehuantepec; but in the province of Oaxaca, between the sources of the rivers Chimalapa and Guasacualco, it occupies the centre of the Mexican isthmus. From the 18½° to the 21° of latitude, in the intendancies of la Puebla and Mexico, from Misteca to the mines of Zimapan, the Cordillera stretches from south to north, and approaches the eastern coast.

In this part of the great plain of Anahuac, between the capital of Mexico, and the small cities of Xalappa and Cordoba, a groupe of mountains appears which rivals the most elevated summits of the new continent. It is enough to name four of these Colossi* whose heights were unknown

* Excepting the Cofre de Perote, these four measurements are all geometrical; but the bases being from 11 to 1200 toises elevated above the level of the sea, this first part of the total height was calculated according to the barometrical formula of M. Laplace. The word Popocatepetl is derived from *popocani* smoke, and *tepetl* mountain; and Iztaccihuatl from

before my expedition; Popocatepetl, 5400 metres (or 2771 toises); Iztaccihuatl, or the white woman, 4786 metres (or 2455 toises); Citlaltepetl, or the Pic d'Orizaba, 5295 metres (or 2717 toises); and Nauhcampatepetl, or the Cofre de Perote, 4089 metres (or 2089 toises)*. This groupe of volcanic mountains bears a strong analogy with that of the kingdom of Quito. If the height attributed to Mount St. Elie † be exact, we may admit that it is only under the 19° and 60° of latitude that mountains in the northern hemisphere reach the enormous elevation of 5400 metres above the level of the ocean.

Farther to the north of the parallel of 19°, near the celebrated mines of Zimapan and the Doctor, situated in the intendancy of Mexico, the Cordillera takes the name of Sierra Madre; and then

iztac white, and *ciuatl* woman. Citlaltepetl signifies a mountain brilliant as a star, from *citlaltiae* star, and *tepetl* mountain; for the Pic d'Orizaba appears at a distance like a star when it emits fire. Nauhcampatepetl is derived from *Nauhcampa*, any thing square. It alludes to the form of the small porphyritical rock at the summit of the mountain of Perote, which the Spaniards compare to a coffer (See the Vocabulary of the Aztec Language by Father Alonzo de Molina, published at Mexico in 1571, p. 63).

* 17716, 15700, 17371, and 13414 feet. *Trans.*

† The Spanish navigators found, in 1791, by precise means its height above the level of the sea to be 2793 toises (17875 English feet) while it is said in the account of the voyage of La Perouse to be only 1980 toises (12672 feet).

leaving the eastern part of the kingdom it runs to the north-west, towards the cities of San Miguel el Grande, and Guanaxuato. To the north of this last city, considered as the Potosi of Mexico, the Sierra Madre becomes of an extraordinary breadth. It divides immediately into three branches, of which the most eastern runs in the direction of Charcas and the Real de Catorce, and loses itself in the new kingdom of Leon. The western branch occupies a part of the intendancy of Guadalaxara. After passing Bolaños it sinks rapidly, and stretches by Culiacan and Arispe, in the intendancy of Sonora, to the banks of the Rio Gila. However, it acquires again a considerable degree of height under the 30° of latitude in Tarahumara, near the gulf of California, where it forms the mountains de la Primeria alta, celebrated for the gold washed down from them. The third branch of the Sierra Madre, which may be considered as the central chain of the *Mexican Andes*, occupies the whole extent of the intendancy of Zacatecas. We may follow it through Durango and the Parral in New Biscay, to the *Sierra de los Mimbres* (situated to the west of the *Rio grande del Norte*). From thence it traverses New Mexico, and joins the crane mountains (Montagnes de la Grue) and the Sierra Verde. This mountainous country, situated under the 40° of latitude, was examined in 1777 by Fathers Escalante and Font. The Rio Gila rises here, of which the sources are near

those of the Rio del Norte. It is the crest of this central branch of the Sierra Madre which divides the waters between the Pacific and Atlantic Ocean. It was a continuation of this branch which Fidler and the intrepid Mackenzie examined under the 50° and 55° of north latitude.

We have thus sketched a view of the Cordilleras of New Spain. We have remarked that the coasts alone of this vast kingdom possess a warm climate adapted for the productions of the West Indies. The intendancy of Vera Cruz, with the exception of the plain which extends from Perote to the Pic d'Orizaba, Yucatan, the coast of Oaxaca, the maritime provinces of New Santander and Texas, the new kingdom of Leon, the province of Cohahuila, the uncultivated country called Bolson de Mapimi, the coast of California, the western part of Sonora, Cinaloa, and New Gallicia, the southern regions of the intendancies of Valladolid, Mexico, and La Puebla, are low grounds intersected with very inconsiderable hills. The mean temperature of these plains, of those at least situated within the tropics, and whose elevation above the level of the sea does not exceed 300* metres, is from 25° to 26°† of the centigrade thermometer; that is to say, from 8° to 9° ‡ greater than the mean heat of Naples.

* 984 feet. *Trans.* † 77° of Fahrenheit's. *Trans.*

‡ From 14° to 16° of Fahrenheit. *Trans.*

These fertile regions, which the natives call *Tierras calientes*, produce in abundance sugar, indigo, cotton, and bananas. But when Europeans, not seasoned to the climate, remain in these countries for any time, particularly in populous cities, they become the abode of the yellow fever, known by the name of black vomiting, or *vomito prieto*. The port of Acapulco, and the vallies of Papagayo and Peregrino, are among the hottest and unhealthy places of the earth. On the eastern coast of New Spain, the great heats are occasionally interrupted by strata of cold air, brought by the winds from Hudson's Bay towards the parallels of the Havannah and Vera Cruz. These impetuous winds blow from October to March; they are announced by the extraordinary manner in which they disturb the regular recurrence of the small atmospherical tides*, or horary variations of the barometer; and they frequently cool the air to such a degree, that at Havannah the centigrade thermometer descends to 0° †, and at Vera Cruz to 16°,‡; a prodigious fall for countries in the torrid zone.

On the declivity of the Cordillera, at the elevation of 12 or 1500 § metres, there reigns perpetu-

* I have explained this phenomenon in the first volume of my Travels (*Physique generale*), p. 92, 94.

† 32° of Fahrenheit. *Trans.* ‡ 60° of Fahrenheit. *Trans.*

§ From 3936 to 4920 feet. *Trans.*

ally a soft spring temperature, which never varies more than four or five degrees (seven or nine of Fahrenheit). The extremes of heat and cold are there equally unknown. The natives give to this region the name of *Tierras templadas*, in which the mean heat of the whole year is from 20° to 21°*. Such is the fine climate of Xalappa, Tasco, and Chilpansingo, three cities celebrated for their great salubrity, and the abundance of fruit trees which grow in their neighbourhood. Unfortunately, this mean height of 1300 metres† is the height to which the clouds ascend above the plains adjoining to the sea; from which circumstance these temperate regions, situated on the declivity (for example, the environs of the city of Xalappa), are frequently enveloped in thick fogs.

It remains for us to speak of the third zone, known by the denomination of *Tierras frias*. It comprehends the plains elevated more than 2200‡ metres above the level of the ocean, of which the mean temperature is under 17°§. In the capital of Mexico, the centigrade thermometer has been known to fall several degrees below the freezing point; but this is a very rare phenomenon; and the winters are usually as mild there as at Naples. In the coldest season, the mean heat of the day is

* From 68° to 70° of Fahrenheit. *Trans.*

† 4264 feet. *Trans.* ‡ 7217 feet. *Trans.*

§ 62° of Fahrenheit. *Trans.*

from 13° to 14°*. In summer the thermometer never rises in the shade above 24°†. The mean temperature of the whole table-land of Mexico is in general 17° ‡ which is equal to the temperature of Rome. Yet this same table-land, according to the classification of the natives, belongs, as we have already stated, to the *Tierras frias;* from which we may see that the expressions, hot or cold, have no absolute value. At Guayaquil, under a burning sky, the people of colour complain of excessive cold, when the centigrade thermometer suddenly sinks to 24°§, while it remains the rest of the day at 30°‖.

But the plains more elevated than the valley of Mexico, for example, those whose absolute height exceeds 2500 metres ¶, possess, within the tropics, a rude and disagreeable climate, even to an inhabitant of the north. Such are the plains of Toluca, and the heights of Guchilaque, where, during a great part of the day, the air never heats to more than 6° or 8° **, and the olive tree bears no fruit, though it is cultivated successfully a few hundred metres lower in the valley of Mexico.

All these regions called cold enjoy a mean temperature of from 11° to 13° ††, equal to that of

* From 55° to 70° of Fahrenheit. *Trans.*

† 75° of Fahrenheit. *Trans.* ‡ 62° of Fahrenheit. *Trans.*

§ 75° of Fahrenheit. *Trans.* ‖ 86° of Fahrenheit. *Trans.*

¶ 8201 feet. *Trans.* ** 43° or 46° of Fahrenheit. *Trans.*

†† From 51° to 55° of Fahrenheit. *Trans.*

France and Lombardy. Yet the vegetation is less vigorous, and the European plants do not grow with the same rapidity as in their natal soil. The winters, at an elevation of 2500 metres, are not extremely rude; but the sun has not sufficient power in summer over the rarefied air of these plains to accelerate the development of flowers, and to bring fruits to perfect maturity. This constant equality, this want of a strong ephemeral heat, imprints a peculiar character on the climate of the higher equinoxial regions. Thus the cultivation of several vegetables succeeds worse on the ridge of the Mexican Cordilleras than in plains situated to the north of the tropic, though frequently the mean heat of these plains is less than that of the plains between the 19° and 22° of latitude.

These general considerations on the physical division of New Spain are extremely interesting in a political view. In France, even in the greatest part of Europe, the employment of the soil depends almost entirely on geographical latitude; but in the equinoxial regions of Peru, New Grenada, and Mexico, the climate, productions, aspect, I may say physiognomy, of the country, are solely modified by the elevation of the soil above the level of the sea. The influence of geographical position is absorbed in the effect of this elevation. Lines of cultivation similar to those drawn by Arthur Young and M. Decandolle on the hori-

zontal projections of France can only be indicated on sections of New Spain. Under the 19° and 22° of latitude, sugar, cotton, particularly cacas and indigo, are only produced abundantly at an elevation of from 6 to 800* metres †. The wheat of Europe occupies a zone on the declivity of the mountains, which generally commences at 1400 metres, and ends at 3000 ‡ metres. The banana tree *(musa paradisiaca)*, the fruit of which constitutes the principal nourishment of all the inhabitants of the tropics, bears almost no fruit above 1550 metres §; the oaks of Mexico grow only between 800 and 3000 metres ‖; and the pines never descend towards the coast of Vera Cruz farther down than 1850 ¶, nor rise near the region of perpetual snow to an elevation of more than 4000 ** metres ††.

The provinces called *internas*, situated in the temperate zone (particularly those included be-

* From 1968 to 2624 feet. *Trans.*

† I speak here merely of the general distribution of the vegetable productions. I shall afterwards specify places where, favoured by a particular exposure, sugar and cotton may be cultivated 1700 metres (5576 feet) above the ocean.

‡ 4592 and 9842 feet. *Trans.* § 5084 feet. *Trans.*

‖ Between 2624 and 9842 feet. *Trans.*

¶ 6068 feet. *Trans.* ** 13123 feet. *Trans.*

†† The reader may consult the section of the road from Mexico to Vera Cruz (plate VI.), and the agricultural scale in my essay on the geography of plants, p. 139.

tween the 30° and 38° of latitude) enjoy, like the rest of North America, a climate essentially different from that of the same parallels in the old continent. A remarkable inequality prevails between the temperature of the different seasons. German winters succeed to Neapolitan and Sicilian summers. It would be superfluous to assign here other causes for this phenomenon than the great breadth of the continent and its prolongation towards the north pole. This subject has been discussed by enlightened natural philosophers, particularly by M. Volney, in his excellent work on the soil and climate of the United States, with all the care which it deserves. I shall merely observe that the difference of temperature observable between the same latitudes of Europe and America, is much less remarkable in those parts of the new continent bordering on the Pacific Ocean than in the eastern parts. M. Barton has proved, from the state of agriculture and the natural distribution of vegetables, that the Atlantic provinces are much colder than the extensive plains situated to the west of the Alleghany mountains.

A remarkable advantage for the progress of national industry arises from the height at which nature, in New Spain, has deposited the precious metals. In Peru the most considerable silver mines, those of Potosi, Pasco, and Chota, are immensely elevated very near the region of perpetual snow. In working them, men, provisions,

and cattle must all be brought from a distance. Cities situated in plains, where water freezes the whole year round, and where trees never vegetate, can hardly be an attractive abode. Nothing can determine a free-man to abandon the delicious climate of the vallies to insulate himself on the top of the Andes but the hope of amassing wealth. But in Mexico, the richest seams of silver, those of Guanaxuato, Zacatecas, Tasco, and Real del Monte, are in moderate elevations of from 1700 to 2000 metres*. The mines are surrounded with cultivated fields, towns, and villages; the neighbouring summits are crowned with forests; and every thing facilitates the acquisition of this subterraneous wealth.

In the midst of so many advantages bestowed by nature on the kingdom of New Spain, it suffers in general, like Old Spain, from the want of water and navigable rivers. The great river of the north (Rio Bravo del Norte) and the Rio Colorado, are the only rivers worthy of fixing the attention of travellers, either for the length of their course, or the mass of water which they pour into the ocean. The Rio del Norte, from the mountains of the Sierra Verde (to the east of the lake of Timpanogos) to its mouth in the province of New Santander, has a course of 512 leagues. The course of the Rio Colorado is 250. But these two rivers,

* From 5576 to 6561 feet. *Trans.*

situated in the most uncultivated part of the kingdom, can never be interesting for commerce, till great changes in the social order, and other favourable events, introduce colonization into these fertile and temperate regions. These changes are not perhaps very distant. The banks of the Ohio were even in 1797 so thinly inhabited*, that thirty families could hardly be found in a space of 130 leagues, while the habitations are now so multiplied that they are never more than one or two leagues distant from one another.

In the whole equinoxial part of Mexico there are only small rivers, the mouths of which are of considerable size. The narrow form of the continent prevents the collection of a great mass of water. The rapid declivity of the Cordillera abounds more properly with torrents than rivers. Mexico is in the same state with Peru, where the Andes approach so near to the coast as to occasion the aridity of the neighbouring plains. Among the small number of rivers in the southern part of New Spain, the only ones which may in time become interesting for interior commerce are, 1. The Rio Guasacualco, and the Rio Alvarado, both to the south-east of Vera Cruz, and adapted for facilitating the communication with the kingdom of Guatimala; 2. The Rio de Moctezuma, which carries the waters of the lakes and valley of

* *Voyage de Michaux a l'ouest des Monts Alleghanys*, p. 115.

Tenochtitlan to the Rio de Panuco, and by which, forgetting that Mexico is 2277 metres* elevated above the level of the sea, a navigation has been projected between the capital and the western coast; 3. The Rio de Zacatula; 4. The great river of Santiago, formed by the junction of the rivers Lerma and las Laxas, which might carry the flour of Salamanca, Zelaya, and perhaps the whole intendancy of Guadalaxara, to the port of San Blas, or the coast of the Pacific Ocean.

The lakes with which Mexico abounds, and of which the most part appear annually on the decline, are merely the remains of immense basins of water, which appear to have formerly existed on the high and extensive plains of the Cordillera. I shall merely mention in this physical view the great lake of Chapala in New Gallicia, of nearly 160 square leagues, double the size of the lake of Constance; the lakes of the valley of Mexico, which include a fourth part of its surface; the lake of Patzcuaro, in the intendancy of Valladolid, one of the most picturesque situations which I know in either continent; and the lakes of Mexitlan and Parras in New Biscay.

The interior of New Spain, especially a great part of the high table-land of Anahuac, is destitute of vegetation; its arid aspect brings to mind in some places the plains of the two Castilles. Se-

* 7468 feet. *Trans.*

veral causes concur to produce this extraordinary effect. The evaporation which takes place on great plains is sensibly increased by the great elevation of the Mexican Cordillera. On the other hand, the country is not of sufficient elevation for a great number of summits to penetrate the region of perpetual snow. This region commences under the equator at 4800 metres * (2460 toises), and under the 45° of latitude at 2550† metres (1300 toises) above the level of the sea. In Mexico the eternal snows commence, according to my measurements in the 19° and 20° of latitude, at 4600‡ metres (2350 toises) of elevation. Hence, of six colossal mountains which nature has ranged in the same line, between the parallels of 19° and 19½°, only four, the Pic d'Orizaba, Popocatepetl, Iztaccihuatl, and the Nevado de Toluca, are covered with perpetual snow, while the two others, the Cofre de Perote, and the Volcan de Colima, remain uncovered the greatest part of the year. To the north and south of *this parallel of great elevations*, beyond this singular zone, in which the new Volcan de Jorullo is also ranged, there are no mountains which exhibit the phenomenon of perpetual snow.

These snows, at the period of their *minimum*, in the month of September, never descend in the

* 15747 feet. *Trans.* † 8365 feet. *Trans.*
‡ 15091 feet. *Trans.*

parallel of Mexico below 4500 metres*. But in the month of January they fall as low as 3700 metres †: this is the period of their maximum. The *oscillation* of the limits of perpetual snow is, consequently, under the latitude of 19°, from one season to the other 800 metres ‡; while under the equator it never exceeds 60 or 70 metres §. We must not confound these eternal snows with the snows which in winter accidentally fall in much lower regions. Even this phenomenon, like every other in nature, is subject to immutable laws worthy of the investigation of philosophers. This ephemeral snow is never observed under the equator below 3800 or 3900 metres ‖; but in Mexico, under the latitude of 18° and 22° it is commonly seen at an elevation of 3000 metres ¶. Snow has even been seen in the streets of the capital of Mexico at 2277** metres, and 400 metres †† lower in the city of Valladolid.

In general, in the equinoxial regions of New Spain, the soil, climate, physiognomy of vegetables, all assume the character of the temperate zones. The proximity of Canada, the great breadth of the new continent towards the north, the mass of

* 14763 feet. *Trans.* † 12138 feet. *Trans.*
‡ 2624 feet. *Trans.* § 196 or 229 feet. *Trans.*
‖ From 12466 to 12794 feet. *Trans.*
¶ 9842 feet. *Trans.* ** 7468 feet. *Trans.*
†† 6156 feet. *Trans.*

snows with which it is covered, occasion in the Mexican atmosphere frigorifications by no means to be expected in these regions.

If the table-land of New Spain is singularly cold in winter, its temperature is, on the other hand, much higher in summer than what was found by the thermometrical observations of Bouguer and La Condamine in the Andes of Peru. The great mass of the Cordillera of Mexico, and the immense extent of its plains, produce a reverberation of the solar rays, never observed in mountainous countries of greater inequality. This heat, and other local causes, produce the aridity of these fine regions.

To the north of 20°, from the 22° to the 30° of latitude, the rains which only fall in the months of June, July, August, and September, are very unfrequent in the interior of the country. We have already observed that the great height of this table-land, and the small barometrical pressure of the rarefied air, accelerate the evaporation. The ascending current or column of warm air which rises from the plains prevents the clouds from precipitating in rain to water a land, dry, saline, and destitute of vegetation. The springs are rare in mountains composed principally of porous amygdaloid, and fendilated *(fendillé)* porphyry. The filtrated water, in place of collecting in small subterraneous basins, is lost in the crevices which old volcanic revolutions have opened, and only is-

sues forth at the bottom of the Cordillera. It forms a great number of rivers on the coast, of which the course is very short on account of the configuration of the country.

The aridity of the central plain, the want of trees, occasioned, perhaps, in a good measure by the length of time the great vallies have remained covered with water, obstruct very much the working of the mines. These disadvantages have augmented since the arrival of Europeans in Mexico, who have not only destroyed without planting, but in draining great extents of ground have occasioned another more important evil. Muriate of soda and lime, nitrate of potash, and other saline substances, cover the surface of the soil, and spread with a rapidity very difficult to be explained. Through this abundance of salt, and these efflorescences, hostile to cultivation, the table-land of Mexico bears a great resemblance in many places to Thibet and the saline steppes of central Asia. In the valley of Tenochtitlan, particularly, the sterility and want of vigorous vegetation have been sensibly augmenting since the Spanish conquest; for this valley was adorned with beautiful verdure when the lake occupied more ground, and the clayey soil was washed by more frequent inundations.

Happily, however, this aridity of soil, of which we have been indicating the principal physical causes, is only to be found in the most elevated

plains. A great part of the vast kingdom of New Spain belongs to the most fertile regions of the earth. The declivity of the Cordillera is exposed to humid winds and frequent fogs; and the vegetation nourished with these aqueous vapours exhibits an uncommon beauty and strength. The humidity of the coasts, assisting the putrefaction of a great mass of organic substances, gives rise to maladies, to which Europeans and others not seasoned to the climate are alone exposed; for under the burning sun of the tropics the unhealthiness of the air almost always indicates extraordinary fertility of soil. Thus at Vera Cruz the quantity of rain in a year amounts to $1^{m},62$*, while in France it scarcely amounts to $0^{m},80$ †. Yet with the exception of a few sea-ports and deep vallies, where the natives suffer from intermittent fevers, New Spain ought to be considered as a country remarkably salubrious.

The inhabitants of Mexico are less disturbed by earthquakes and volcanic explosions than the inhabitants of Quito, and the provinces of Guatimala and Cumana. There are only five burning volcanoes in all New Spain, Orizaba, Popocatepetl, and the mountains of Tustla, Jorullo, and Colima. Earthquakes, however, are by no means rare on the coast of the Pacific Ocean, and in the environs of the capital; but they never produce such desolating

* 63.780 inches. *Trans.* † 37.496 inches. *Trans.*

effects as have been witnessed in the cities of Lima, Riobamba, Guatimala, and Cumana. On the 14th September, 1759, a horrible catastrophe took place: the volcanos of Jorullo burst, and was seen surrounded with an innumerable multitude of small smoking cones. Subterraneous noises, so much the more alarming as they were followed by no phenomenon, were heard at Guanaxuato in the month of January 1784. All these phenomena seem to prove, that the country between the parallels of 18° and 22° contains an active internal fire, which pierces, from time to time, through the crust of the globe, even at great distances from the sea shore.

The physical situation of the city of Mexico possesses inestimable advantages, if we consider it in the relation of its communication with the rest of the civilized world. Placed on an isthmus, washed by the South Sea and Atlantic Ocean, Mexico appears destined to possess a powerful influence over the political events which agitate the two continents. A king of Spain resident in the capital of Mexico, might transmit his orders in five weeks to the Peninsula in Europe, and in six weeks to the Philippine islands in Asia. The vast kingdom of New Spain, under a careful cultivation, would alone produce all that commerce collects together from the rest of the globe, sugar, cochineal, cacao, cotton, coffee, wheat, hemp, flax, silk, oils, and wine. It would furnish every metal with-

out even the exception of mercury. Superb timber and an abundance of iron and copper would favour the progress of Mexican navigation; but the state of the coasts and the want of ports from the mouth of the Rio Alvarado to the mouth of the Rio Bravo, oppose obstacles in this respect which would be difficult to overcome.

These obstacles, it is true, do not exist on the coast of the Pacific Ocean. San Francisco in New California, San Blas in the intendancy of Guadalaxara, near the mouth of the river Santiago, and especially Acapulco, are magnificent ports. The last, probably formed by a violent earthquake, is one of the most admirable basins in the whole world. In the South Sea there is only Coquimbo on the coast of Chili which can be compared with Acapulco; yet in winter, during great hurricanes, the sea becomes very rough in Acapulco. Farther south we find the port of Rialexo, in the kingdom of Guatimala, formed, like Guayaquil, by a large and beautiful river. Sonzonate is very much frequented during the fine season, but it is merely an open road like Tehuantepec, and is consequently very dangerous in winter.

When we examine the eastern coast of New Spain we see that it does not possess the same advantages as the western coast. We have already observed, that, properly speaking, it possesses no port; for Vera Cruz, by which an annual commerce of fifty or sixty millions of piastres is car-

ried on, is merely a bad anchorage between the shallows of la Caleta, la Gallega, and la Lavandera. The physical cause of this disadvantage is easily discovered. The coast of Mexico, along the Mexican gulf, may be considered as a dike against which the trade winds, and perpetual motion of the waves from east to west, throw up the sands which the agitated ocean carries along. This current of rotation runs along South America from Cumana to the isthmus of Darien; it ascends towards Cape Catoche, and after whirling a long time in the Mexican gulf, issues through the canal of Florida, and flows towards the banks of Newfoundland. The sands heaped up by the vortices of the waters, from the peninsula of Yucatan to the mouths of the Rio del Norte and the Mississipi, insensibly contract the basin of the Mexican gulf. Geological facts of a very remarkable nature prove this increase of the continent; we see the ocean every where retiring. M. Ferrer found near Sotto la Marina, to the east of the small town of New Santander, ten leagues in the interior of the country, moving sands filled with sea shells. I myself observed the same thing in the environs of Antigua and New Vera Cruz. The rivers which descend from the Sierra Madre and enter the Atlantic Ocean have in no small degree contributed to increase the sand banks. It is curious to observe that the eastern coasts of Old and New Spain are equally disadvantageous for navigation.

The coast of New Spain, from the 18° to the 26° of latitude, abounds with bars; and vessels which draw more than 32 centimetres * of water, cannot pass over any of these bars, without danger of grounding. Yet obstacles like these, so unfavourable for commerce, would at the same time facilitate the defence of the country against the ambitious projects of a European conqueror.

The inhabitants of Mexico, discontented with the port of Vera Cruz, if we may give the name of port to the most dangerous of all anchorages, entertain the hope of finding out surer channels for the commerce with the mother country. I shall merely name the mouths of the rivers Alvarado and Guasacualco to the south of Vera Cruz; and to the north of that city the Rio Tampico, and especially the village of Sotto la Marina, near the bar of Santander. These four points have long fixed the attention of the government; but even there, however advantageous in other respects, the sand banks prevent the entry of large vessels. These ports would require to be artificially corrected; but it becomes necessary in the first place to enquire if the localities are such as to warrant a belief that this expensive remedy would be durable in its effects. It is to be observed, however, that we still know too little of the coasts of New Santander and Texas, particu-

* 12,598, say 12½ inches.

larly that part to the north of the Lake of S. Bernard or Carbonera, to be able to assert that in the whole of this extent nature presents the same obstacles and the same bars. Two Spanish officers of distinguished zeal and astronomical knowledge, MM. Cevallos and Herrera, have engaged in this interesting and useful investigation. At present Mexico is in a military dependence on the Havannah, which is the only neighbouring port capable of receiving squadrons, and the most important point for the defence of the eastern coast of New Spain. Accordingly, the government, since the last taking of the Havannah by the English, has been at enormous expenses in increasing the fortifications of the place. Sensible of its true interests, the court of Madrid has wisely laid it down as a principle, that the dominion of the island of Cuba is essential for the preservation of New Spain.

A very serious inconvenience is common to the eastern coast, and to the coast washed by the Great Ocean, falsely called the Pacific Ocean. They are rendered inaccessible for several months by violent tempests, which effectually prevent all navigation. The north winds *(los nortes)*, which are north-west winds, blow in the gulf of Mexico from the autumnal to the spring equinox. These winds are generally moderate in the months of September and October: their greatest fury is in

the month of March; and they sometimes last to April. Those navigators who have long frequented the port of Vera Cruz know the symptoms of the coming tempest as a physician knows the symptoms of an acute malady. According to the excellent observations of M. Orta, a great change in the barometer, and a sudden interruption in the regular recurrence of the horary variations of that instrument, are the sure forerunners of the tempest. It is accompanied by the following phenomena. At first a small land wind *(terral)* blows from the west-north-west; and to this *terral* succeeds a breeze, first from the north-east and then from the south. During all this time a most suffocating heat prevails; and the water dissolved in the air is precipitated on the brick walls, the pavement, and iron or wooden balustrades. The summits of the Pic d'Orizaba and the Cofre de Perote, and the mountains of Villa Rica, particularly the Sierra de San Martin, which extends from Tustla to Guasacualco, appear uncovered with clouds, while their bases are concealed under a veil of demi-transparent vapours. These cordilleras appear projected on a fine azure ground. In this state of the atmosphere the tempest commences, and sometimes with such impetuosity, that before the lapse of a quarter of an hour it would be dangerous to remain on the mole in the port of Vera Cruz. All communication between the city

and the castle of S. Juan d'Ulua is thenceforth interrupted. These north wind hurricanes generally remain for three or four days, and sometimes for ten or twelve. If the north wind change into a south breeze, the latter is very inconstant, and it is then probable that the tempest will recommence; but if the north veers to east by the north-east, then the breeze or fine weather is durable. During winter we may reckon on the breeze continuing for three or four successive days, an interval more than sufficient for allowing any vessel leaving Vera Cruz to get out to sea and escape the sand banks adjoining to the coast. Sometimes even in the months of May, June, July and August, very strong hurricanes are felt in the gulf of Mexico. They are called *nortes de hueso colorado;* but fortunately they are not very common. The periods in which the black vomiting *(yellow fever)* and tempests from the north prevail at Vera Cruz do not coincide, consequently the European who arrives in Mexico, and the Mexican whose affairs compel him to embark, or to descend from the table-land of New Spain to the coast, have both to make their election between the danger of navigation and a mortal disease.

The western coast of Mexico is of very dangerous navigation during the months of July and August, when terrible hurricanes blow from the

south-west. At that time, and even in September and October, the ports of San Blas and Acapulco are of very difficult access. Even in the fine season, from the month of October to the month of May *(verano de la mar del Sur)*, the tranquillity of the Pacific Ocean is interrupted on this coast by impetuous winds from the north-east and the north-north-east, known by the names of *papagallo* and *tehuantepec*.

Having myself experienced one of these tempests, I shall in another place proceed to examine whether these purely local winds are the effect of the neighbouring volcanos, as some navigators seem to think, or whether they proceed from the narrowness of the Mexican isthmus. We might be led to believe that the equilibrium of the atmosphere being disturbed in the months of January and February on the coast of the Atlantic, the agitated air flows back with impetuosity towards the Great Ocean. According to this supposition, the Tehuantepec is merely the effect, or rather the continuation of the north wind of the Mexican gulf and the *brisottes* of St. Martha. It renders the coast of Solinas and la Ventosa almost as inaccessible as that of Nicaragua and Guatimala, where violent south-west winds prevail during the months of August and September, known by the name of *tapayaguas*.

These south-west winds are accompanied with

thunder and excessive rains, while the tehuantepec and papagallos * exert their violence during a clear and azure sky. Thus at certain periods almost all the coasts of New Spain are dangerous for navigators.

* The papagallos blow particularly from Cape Blanc de Nicoya (latitude 9° 30′) to l'Ensenada de S. Catharina (latitude 10° 45′).

BOOK II.

GENERAL POPULATION OF NEW SPAIN. DIVISION OF THE INHABITANTS INTO CASTS.

CHAPTER IV.

General enumeration in 1793. Progress of the population in the ten following years. Proportion of births to burials.

THE physical view which we have been rapidly sketching proves, that in Mexico, as elsewhere, nature has very unequally distributed her benefits. But men, unable to appreciate the wisdom of this distribution, neglect the riches which are within their reach. Collected together on a small extent of territory, in the centre of the kingdom, on the very ridge of the Cordillera, they have allowed the regions of the greatest fertility and the nearest to the coast to remain waste and uninhabited.

The population of the United States is concentrated in the Atlantic division, that is to say, the long and narrow district between the sea and the Alleghany mountains. In the *capitania general* of Caraccas, the only inhabited and well cultivated

districts are those of the maritime regions:—in Mexico improvement and civilization are banished into the interior of the country. In this the Spanish conquerors have merely trod in the steps of the conquered nations. The Aztecs, originally from a country to the north of the Rio Gila, perhaps even emigrants from the most northern parts of Asia, in their progress towards the south never quitted the ridge of the Cordillera, preferring these cold regions to the excessive heat of the coast.

That part of Anahuac which composed the kingdom of Montezuma on the arrival of Cortez did not equal in surface the eighth part of the present kingdom of New Spain. The kings of Acolhuacan, Tlacopan, and Michuacan, were independent princes. The great cities of the Aztecs, and the best cultivated territories were in the environs of the capital of Mexico, particularly in the fine valley of Tenochtitlan. This alone was a sufficient reason to induce the Spaniards to establish there the centre of their new empire; but they loved also to inhabit plains whose climate resembled that of their own country, and where they could cultivate the wheat and fruit trees of Europe. Indigo, cotton, sugar and coffee, the four great objects of West Indian commerce, were to the conquerors of the sixteenth century of very inferior interest; they sought after the precious metals

only with avidity, and the search for these metals fixed them on the ridge of the central mountains of New Spain.

It is equally difficult to estimate with any degree of certainty the number of inhabitants of the kingdom of Montezuma, as to ascertain the ancient population of Egypt, Persia, Greece, or Latium. The extensive ruins of towns and villages observed in Mexico under the 18° and 20° of latitude, undoubtedly prove that the former population of that part of the kingdom was much greater than the present. This interesting fact is confirmed by the letters from Cortez to Charles the Fifth, the memoirs of Bernal Dias, and a great number of other historical monuments *. But when we reflect how difficult it is even in our days to acquire accurate statistical information, we need not be astonished at the ignorance in which we are left by the authors of the sixteenth century, as to the ancient population of the West Indies, Peru, and Mexico. We see in history, on the one hand, conquerors eager to make the most of the fruit of their exploits; and the Bishop of Chapa and a small number of benevolent men, on the other, employing, with a noble ardour, the arms of eloquence against the cruelty of the first colonists.

* See the judicious observations of the Abbe Clavigero on the ancient population of Mexico, directed against Robertson and Pauw. *Storia antica di Messico*, t. IV. p. 282.

All parties were equally interested in exaggerating the flourishing state of the three newly discovered countries. The fathers of St. Francis boasted of having alone baptized from the year 1524 to 1540 more than six millions of Indians, and, what is more, of Indians who merely inhabited the parts most adjacent to the capital.

A striking example may serve to shew us how circumspect we ought to be in yielding implicit faith in the numbers found in the old descriptions of America. It has recently been printed *, that in the enumeration of the inhabitants of Peru, made by the archbishop of Lima, Fray Geronimo de Loaysa, in 1551, were found 8,285000 Indians. This is an afflicting fact for those who know that in 1793, on a very exact enumeration ordered by Gil-Lemos, the viceroy, the Indians of the present Peru (since the separation of Chili and Buenos Ayres) did not exceed 600,000 individuals. Here we might be tempted to believe that 7,600,000 Indians had disappeared from the face of the globe. Luckily, however, the assertion of the Peruvian author is entirely false; for on the most careful investigation of the archives of Lima by Father Cisneros, it has been discovered that the existence of eight millions in 1551 rests on no historical document. M. Feyjoo, the author of

* *Relacion de la ciudad de Truxillo por el Doctor Feyjoo*, 1763, p. 29.

the statistical account of Truxillo, has even since declared that this bold assertion was merely founded on a supposititious calculation, from the enumeration of so many ruined towns, since the epoch of the conquest. These ruins appeared to him demonstrative of an immense population in Peru at a remote period. It frequently happens, however, that the examination of an erroneous opinion leads to some important truth. Father Cisneros, on rummaging in the archives of the sixteenth century, discovered that the viceroy Toledo, very justly regarded as the Spanish legislator of Peru, reckoned in 1575, in the examination of the kingdom which he made in person from Tumbez to Chuquisagua (which is nearly the present extent of Peru), only about a million and a half of Indians.

Nothing in general is more vague than the judgment which we form of the population of a newly discovered country. The celebrated Cook estimated the number of inhabitants of Oteheite at 100,000; the protestant missionaries of Great Britain suppose a population of 49,000 souls; Captain Wilson reduces it to 16,000; and M. Turnbull has attempted to prove that the real number of inhabitants does not exceed 5,000. I cannot allow myself to believe that these differences are the effect of a progressive depopulation. The maladies with which the civilized nations of Europe infected these once happy countries must,

no doubt, have caused a depopulation; but it could never have been so rapid as to carry off in forty years nineteen-twentieth parts of the inhabitants *.

We have already mentioned that the environs of the capital of Mexico, and perhaps all the countries under the domination of Montezuma, were probably much more populous formerly than

* Captain Cook may have somewhat exaggerated the number of inhabitants of Otaheite; but when we consider that he did not form his estimate so much from conjectural circumstances as from having seen the whole population of the island, drawn to the coast by the novel appearance of the strangers, pass, as it were, in review before him, we shall be perhaps rather inclined to acquiesce in this estimate. We shall be the more induced to this when we consider how near soldiers or sailors, accustomed to form rapid estimates of the numbers of masses of men, often approach to the truth. Besides Captain Cook was in general extremely sober and moderate in his judgments.

That the population, then, has declined prodigiously is almost certain; and it is no less certain, that whatever produced the physical alteration in the inhabitants related by Vancouver, must have contributed in no small degree to the decline. This navigator, as is well known, twice visited the island. In the first voyage when he accompanied Cook, the beauty of the inhabitants, particularly the females, was universally remarked; but in the last voyage, in which were several of those who had been, as well as Vancouver, of the former, they all agreed that the appearance of the people was totally changed, and they did not discover a single woman in the island who was not deformed and ugly. *Trans.*

at present*; but this great population was concentrated in a very small space. We observe (and the observation is consoling for humanity) that not only has the number of Indians been on the increase for the last century, but that the whole of the vast region which we designate by the general name of New Spain is much better inhabited at present than it was before the arrival of the Europeans. The first of these assertions is proved by the state of the capitation which we shall afterwards give; and the last is founded on a very simple consideration. In the beginning of the sixteenth century, the Otomites, and other barbarous people, occupied the countries situated to the north of the rivers Panuco and Santiago; but since an improved cultivation of the soil and civilization have advanced towards New Biscay and the *provincias internas*, the population has increased there with the rapidity every where remarked where a nation of shepherds is replaced by agricultural colonists †.

* Clavigero, *Storia antica di Messico*, t. I. p. 36.

† The author may be very probably in the right; yet it is but an indifferent proof that the population of the whole kingdom has increased, because, in those places where shepherds have given place to agriculturists, the population has been rapidly increasing. By a similar mode of reasoning, it may be concluded that the population of Britain is on the decline, because the population of the highlands of Scotland, converted from agriculture to sheep farming, is on the decline. *Trans.*

Politico-œconomical investigations, grounded on exact numbers, were very unusual in Spain even before Campomanes, and the minister Count Florida Blanca. We are not then to be astonished that the archives of the viceroyalty of Mexico contain no enumeration before 1794, when the Count de Revillagigedo, one of the wisest and most active administrators, had resolution enough to undertake it. In the operations regarding the population of Mexico, by order of the viceroy Pedro Cebrian Count de Fuenclara, in 1742, the number of families only was estimated; and what has been preserved to us by Villa Señor is both incomplete and inaccurate. Those who know the difficulties of an enumeration in the most cultivated countries of Europe, who know that the economists assigned only eighteen millions of inhabitants to all France, and that it has been even recently disputed if the true population of Paris * were 500,000 or 800,000, will easily imagine what powerful obstacles are to be overcome in a country, where those who are employed are little skilled in such kind of statistical researches. Hence the viceroy Revillagigedo was unable to terminate his undertaking; and it appears that the enumeration was not completed in the two intend-

* La population habituelle de cette grande capitale paroît être de 547,000 habitans. *Peuchet*, Stat. de la France, p. 93.

ancies of Guadalaxara and Vera Cruz, and in the small province of Cohahuila.

The following is a state of the population * of New Spain, from the notices transmitted by the intendants and governors of provinces to the viceroy, previous to the 12th May, 1794:

Names of the intendancies and governments in which the enumeration was completed in 1793.	POPULATION Of the intendancies and governments.	Of the capitals
Mexico	1,162,886	112,926
Puebla	566,443	52,717
Tlascala	59,177	3,357
Oaxaca	411,366	19,069
Valladolid	289,314	17,093
Guanaxuato	397,924	32,098
San Luis Potosi	242,280	8,571
Zacatecas	118,027	25,495
Durango	122,866	11,027
Sonora	93,396	
Nuevo Mexico	30,953	
The two Californias	12,666	
Yucatan	358,261	28,392
Total population of New Spain deduced from the enumeration of 1793	3,865,529	
In a report to the king, Count de Revillagigedo estimated the intendancy of Guadalaxara at (Inhabitants. 485,000)		
Intendancy of Vera Cruz at 120,000	618,000	
Province of Cohahuila at 13,000		
Approximative result of the enumeration in 1793	4,483,529 inhabitants.	

* I publish this state from a copy preserved in the archives of the viceroy. I observed that other copies in circulation in the country contain different numbers; for example, 638,771 souls for the intendancy of la Puebla, including the ancient republic of Tlascala.

This result exhibits the minimum of population admissible at the period. The central government, particularly the administrations spread over the interior of the country, soon perceived how far they were from the end which they had in view. In the new continent, as well as in the old, every enumeration is considered by the people as a sinister presage of some financial operation. In the fear of an augmentation of imposts, every head of a family endeavoured to diminish the number of individuals of his house, of which he was to furnish a list. The truth of this assertion is very easily demonstrable. Before the enumeration of the Count de Revillagigedo, the capital of Mexico, for example, was believed to contain 200,000 inhabitants. This estimate might be exaggerated; but the tables of consumption, the number of births and burials, and the comparison of these numbers with those of the great cities of Europe, all tended to prove that the population of Mexico exceeded at least 135,000 souls; and yet the table printed by order of the viceroy in 1790 exhibits only 112,926. In smaller cities, easier to be controuled, the error was still more considerable. Those also who followed in detail the dissection of the registers of 1793, judged that the number of inhabitants who had withdrawn themselves from the general enumeration could by no means be compensated by those, who, wandering about without any fixed domicile, had been several times

included in it. It was supposed that a sixth or a seventh part ought at least to be added to the sum total, and the population of all New Spain was accordingly estimated at 5,200,000 souls.

The viceroys who succeeded to the Count de Revillagigedo have never renewed the enumeration; and since that time, the government has paid very little attention to statistical researches. Several memoirs drawn up by intendants on the actual state of the country confided to their care contain exactly the same numbers as the table of 1793, as if the population could have remained the same for ten years. It is certain, however, that this population has made the most extraordinary progress. The augmentation of tithes and of the Indian capitation, and of all the duties on consumption, the progress of agriculture and civilization, the aspect of a country covered with newly constructed houses, announce a rapid increase in every part of the kingdom. How are we to conceive then that social institutions can be so defective, and a government so iniquitous, as to pervert the order of nature, and prevent the progressive multiplication of our species in a fertile soil and temperate climate? Happy the portion of the globe where a peace of three centuries has almost effaced the very recollection of the crimes produced by the fanaticism and insatiable avarice of the first conquerors!

In order to draw up a table of the population

in 1803, and to exhibit numbers as near to the truth as possible, it was necessary to augment the result of the last enumeration: 1. with that part of the inhabitants omitted to be entered in the lists; and 2. with the excess of the births above the burials. I wished rather to adopt a number below the actual population, than to hazard suppositions which might appear extravagant. I have therefore lowered the estimated number of inhabitants omitted in the general census, and in place of a sixth adopted a tenth.

As to the progressive augmentation of the population since 1793 to the epoch of my journey, I have fixed if from sufficient data. Through the particular kindness with which I was honoured by a respectable prelate, the present Archbishop of Mexico *, I was enabled to enter into minute investigations on the relation between the births and deaths, according to the difference of climates of the central table-land and the regions adjacent to the coast. Several parish priests *(curés)* interested in the solution of so important a problem as the augmentation or diminution of our species, engaged in a very laborious undertaking. They communicated to me the number of baptisms and burials, yearly, from 1752 to 1802; and from the

* Don Francisco Xavier de Lizana. I am also indebted for very important documents to Don Pedro de Fonte, provisor of the archbishopric. See note B, at the end of the work.

whole of these minute registers, which I have preserved, it appears that the proportion of the births to the deaths is nearly as 170 : 100. I shall merely here adduce a few examples to confirm this assertion; and they are so much the more interesting as we have yet no statistical data on the relation of the deaths to the births under the torrid zone.

In the Indian village of Singuilucan, eleven leagues north from the capital, there were from 1750 to 1801, in all, 1950 deaths, and 4560 births: inde, excess of deaths 2610.

In the Indian village of Axapuzco, thirteen leagues north from Mexico, there were, from the period when this village was separated from the parish of Otumba, i. e. from 1767 to 1797, in all, 3511 deaths, and 5528 burials; consequently excess of the births, 2017.

In the Indian village of Malacatepec, twenty-eight leagues west from the valley of Tenochtitlan, there were, between 1752 and 1802, in all, 13,734 births, and 10,529 deaths. Excess of births 3205.

In the village of Dolores, from 1756 to 1801, there were, in all, 24,123 deaths, and 61,258 births; hence the extraordinary excess of 37,135 births.

In the city of Guanaxuato, there were, from 1797 to 1802, 12,666 births, and 6294 deaths; or an excess of 6372 births.

In the village of Marfil, near Guanaxuato, there

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were in the same space of time 3702 births, and 1904 deaths; or an excess of 1798 births.

In the village of St. Anne, near Guanaxuato, there were in five years 3629 births, and 1857 deaths, consequently an excess of 1772 births.

At Yguala, a village situated in a very warm valley near Chilpanzingo, there were during ten years 3373 births, and 2395 deaths, or an excess of 978 births.

In the Indian village Colimaya, situated on a very cold plain, there were, during ten years, 5475 births, and 2602 deaths, or an excess of 2673 births.

In the jurisdiction of the city of Queretaro, there were, in 1793, 5064 births in all, and 2678 deaths, or an excess of 2386 births.

These examples prove that the relation of the deaths to the births is very different according to the climate and salubrity of the air. It is,

At Dolores	= 100 :	253
Singuilucan	= 100 :	234
Calimaya	= 100 :	202
Guanaxuato	= 100 :	201
Sta. Ana	= 100 :	195
Marfil	= 100 :	194
Queretaro	= 100 :	188
Axapuzco	= 100 :	157
Yguala	= 100 :	140
Malacatepec	= 100 :	134
Panuco	= 100 :	127

The mean term of these eleven places would be 100 to 183; but the proportion which may be regarded as suitable for the whole population appears to me to be 100 : 170. In the United States of America, it is as 100 : 201.

It appears that on the high plain of the Cordillera the excess of births is greater than towards the coast, or in the very warm regions. What a difference between the villages of Calimaya and Yguala! At Panuco, where the climate is as hot as at Vera Cruz, although the mortal disease of *black vomiting* has never yet been known there, the number of births from 1793 to 1802 was 1224, and the number of deaths, 988; so that we have here the unfavourable proportion of 100 to 123. Hindostan and South America, particularly the province of Cumana, the coast of Coro, and the plains *(llanos)* of Caraccas, sufficiently prove that heat alone is not the cause of this great mortality. In climates very warm and at the same time very dry the human species enjoys a longevity perhaps greater than what we observe in the temperate zones. This is especially the case whenever the temperature and climate are excessively variable. The Europeans who transport themselves at an age somewhat advanced into the equinoxial part of the Spanish colonies attain there for the most part to a great and happy old age. At Vera Cruz, in the midst of the epidemical *black vomitings*, the na-

tives and strangers seasoned for several years to the climate enjoy the most perfect health.

In general, the coasts and arid plains of equatorial America should be looked upon as healthy, notwithstanding the excessive heat of the sun, whose perpendicular rays are reflected by the soil. Individuals come to maturity, particularly those who approach to old age, have little to fear from these regions, of which the unhealthiness has been unjustifiably exaggerated. The chief mortality is among the children and young people, particularly in those parts, where the climate is at once very warm and very humid. Intermittent fevers prevail all along the coast from Alvarado to Tamiagua, Tampico, and even to the plains of New Santander. The western declivity of the Cordillera of Mexico, and the shores of the South Sea, from Acapulco to the ports of Colima and San Blas, are equally unhealthy. We may compare this humid, fertile and unhealthy territory to the maritime part of the province of Caracas, from New Barcelona to Porto Cabello. Tertian fevers are the scourge of these countries, adorned by nature with the most vigorous vegetation, and rich in every useful production. This scourge is so much the more cruel, as the natives abandon in the most shocking manner all those who are affected. The children especially fall victims to this neglect of the Indians. In these hot and humid regions, the

mortality is so great that the population makes no sensible progress; while in the cold regions of New Spain (and these regions compose the greatest part of the kingdom) the proportion of the births to the deaths is as 190 to 100, or even as 200 to 100.

The proportion of the births and deaths to the population is more difficult to estimate than even the proportion between the births and deaths. In countries where the laws tolerate only one religion, and where the priest *(curé)* draws a part of his revenues from the baptisms and burials, we may know exactly enough the excess of the births above the deaths; but the number which expresses the relation of the deaths to the whole population is affected by a part of the uncertainty which envelopes the population itself. In the town and territory of Queretaro, the population is reckoned at 70,600. If we divide this number by 5064 births and 2678 deaths, we shall find that for every fourteen persons one is born, and that for every twenty-six one dies. At Guanaxuato, including the adjacent mines of St. Anne and Marfil, in a population of 60,100, there are *communibus annis* (assuming the mean term of five years) 3998 births and 2011 deaths. For every fifteen, then, one is born, and every twenty-nine one dies. The relation of the births or deaths to the whole population is in Europe much less favourable to the augmentation of the species. In France, for example, the

births are as one to $28\frac{3}{10}$, and the deaths as one to $30\frac{9}{10}$. This is the precise result deduced by M. *Peuchet* from the tables of births, marriages, and deaths, drawn up in the year nine, in 98 departments, by order of the minister of the interior. Farther north, in the Prussian monarchy, there were in 1802, for nine millions of inhabitants, 436,616 births, and 282,109 deaths: hence the births are one in 20 and the deaths one in 32. But in Sweden, a country less favoured by nature, according to the tables of M. *Nicander*, the most exact and extensive that were ever drawn up, the births are one in 30, and the deaths one in 39.

It appears, in general, that in the kingdom of New Spain the proportion of the births to the population is one in 17, and of the deaths one in 30. We may estimate the present number of births at nearly 350,000, and the deaths at 200,000. This excess of births in favourable circumstances, that is to say, in years without famine, epidemical small-pox, or *matlazahuatl*, the most mortal disease of the Indians, is nearly 150,000. In general, we observe every where on the globe that the population augments with a prodigious rapidity in countries still thinly inhabited, with an eminently fertile soil, a soft and equal temperature, and particularly where there is a robust race of men incited by nature to marriage at a very early age.

The parts of Europe in which cultivation only commenced in the last half of the past century

afford very striking examples of this excess of births. In West Prussia there were in 1784, in a population of 560,000 inhabitants, 27,134 births, and 15,669 deaths. These numbers give the proportion of births to deaths 36 to 20, or 180 : 100, a proportion equally favourable with that of the Indian villages situated in the central plain of Mexico. In the Russian empire, in 1806, the births amounted to 1,361,134, and the deaths to 818,433. The same causes every where produce the same effects. The newer the cultivation of a country is, so much the easier is subsistence on a soil newly torn up, and consequently so much the more rapid the progress of population. To confirm this thesis, we have only to cast our eyes over the proportions of the births to the deaths in the following table.

In France . .	= 110 : 100
England * . .	= 120 : 100
Sweden . .	= 130 : 100
Finland . .	= 160 : 100
Russian empire . .	= 166 : 100
West Prussia . .	= 180 : 100
Government of Tobolsk, according to M. *Hermann*	= 210 : 100
Several places in the table-land of Mexico .	= 230 : 100

* Essay on the principles of population, by M. Malthus, one of the most profound works in political economy which has ever appeared.

United States (state of New Jersey) . . . = 300 : 100

The data which we have taken for the proportion of the births to the deaths, and of both to the whole population, prove that if the order of nature were not inverted from time to time by some extraordinary cause, the population of New Spain would double every nineteen years *. In a period of ten years it should have augmented $\frac{44}{100}$. In the United States we have seen the population double, since 1784, every twenty or twenty-three years. The curious tables published by Mr. Samuel Blodget in his *Statistical Manual for the United States of America* (1806), show that in some states this happy cycle is only thirteen or fourteen years. In France the population would double in the space of 214 years, if no war or no contagious disease were to diminish the annual excedent of the births. Such is the difference between countries already very populous, and those which have yet but a nascent industry.

* Let p represent the actual population of a country, n the proportion of the population to the births, d the proportion of the deaths to the births, and k the number of years at the end of which it is wished to estimate the population, we shall have the state of the population at the epoqua k, expressed by $p\left(1 + n(1 - d)\right)^k$; so that if we would know in how many years the population doubles, this number of years k will be expressed by $k = \frac{\log. 2}{\log. \left(1 + n(1 - d)\right)}$

The only true sign of a real and permanent increase of population is an increase in the means of subsistence. This increase, this augmentation of the produce of agriculture, is evident in Mexico; and appears even to indicate a much more rapid progress of population than has been supposed, in deducing the population of 1803 from the imperfect enumeration of 1793. In a catholic country, the ecclesiastical tenths are, as it were, the thermometer by which we may judge of the state of agriculture; and these tenths, as we shall afterwards state, have doubled in less than 24 years.

All these considerations suffice to prove that in admitting 5,800,000 inhabitants for the kingdom of Mexico at the end of the year 1803, I have taken a number, which, far from being exaggerated, is probably *much below the existing population.* No public calamity has afflicted the country since the enumeration of 1793. If we add, 1st, a tenth for the individuals not included in the enumeration, and 2d, two tenths for the progress of population in ten years, we suppose an excess of births which is less by one half than the result of the parish registers. According to this supposition the number of inhabitants would double every 36 or 40 years. Yet well informed persons who have attentively observed the progress of agriculture, increase of villages and cities, and the augmentation of all the revenues of the crown depending on the consumption of commodities, are

tempted to believe that the population of Mexico has made a much more rapid progress. I am far from pronouncing on so delicate a matter: it is enough for me to have exhibited a detail of the materials hitherto collected, which may lead to accurate results. I consider it as extremely probable, that the population of Mexico in 1808 exceeds 6,500,000. In the Russian empire, of which the political and moral state bears, in many respects, a strong analogy to the country we are describing, the increase of population from the excess of births is much more rapid than what we admit for Mexico. According to the statistical work of M. *Hermann*, the enumeration of 1763 gave 14,726,000 souls. The result of that made in 1783 was nearly 25,677,000; and the total population of Russia in 1805 was estimated at 40,000,000. Yet what obstacles does not nature oppose to the progress of population in the most northern parts of Europe and Asia! And what a contrast between the fertility of the Mexican soil, enriched with the most precious vegetable productions of the torrid zone, and the sterility of plains for more than half the year buried under ice and snow.

CHAPTER V.

Maladies which periodically arrest the progress of population.—Small-pox, natural and inoculated.—Cow-pox.—Matlazahuatl.—Famine.—Health of miners.

It remains for us to examine into the physical causes which almost periodically arrest the progress of Mexican population. These causes are the small-pox, the cruel malady called by the Indians *Matlazahuatl,* and especially famine, of which the effects are felt for a long time.

The small-pox, introduced since 1520, appears only to exercise its ravages every seventeen or eighteen years. In the equinoxial regions it has, like the *black vomiting* and several other diseases, its fixed periods, to which it is very regularly subjected. We might say that in these countries the disposition for certain miasmata is only renewed in the natives at long intervals; for though the vessels from Europe frequently introduce the germ of the small-pox, it never becomes epidemical but after very marked intervals; a singular circumstance, which renders the disease so much the more dangerous for adults. The small-pox committed terrible ravages in 1763, and especially in 1779, in which year it carried off in the capital of Mexico alone more than nine

thousand persons. Every evening tumbrels passed through the streets to receive the corpses, as at Philadelphia during the yellow fever. A great part of the Mexican youth was cut down that year.

The epidemic of 1797 was less destructive, chiefly owing to the zeal with which inoculation was propagated in the environs of Mexico, and in the bishopric of Mechoachan. In the capital of this bishopric the city of Valladolid, of 6800 individuals inoculated only 170, or 2½ per cent. died; and we must also observe, that several of those who perished were inoculated at a time when they were probably already infected in the natural manner. Fifteen in the hundred died of individuals of all ages, who without being inoculated were victims of the natural small-pox. Several individuals, particularly among the clergy, displayed at that period a very praiseworthy patriotism, in arresting the progress of the disease by inoculation. I shall merely mention the names of two enlightened men, M. de Reaño, intendant of Guanaxuato, and Don Manuel Abad, penitentiary canon of the cathedral of Valladolid, whose generous and disinterested views were constantly directed towards the public good. There were then inoculated in the kingdom between 50 and 60,000 individuals.

But in the month of January 1804, the vaccine inoculation was even introduced at Mexico through the activity of a respectable citizen, Don Thomas

Murphy, who brought several times the virus from North America. This introduction found few obstacles; the cow-pox appeared under the aspect of a very trivial malady; and the small-pox inoculation had already accustomed the Indians to the idea that it might be useful to submit to a temporary evil for the sake of evading a greater evil. If the vaccine inoculation, or even the ordinary inoculation, had been known in the new world in the sixteenth century, several millions of Indians would not have perished victims to the small-pox, and particularly to the absurd treatment by which the disease was rendered so fatal. To this disease the fearful diminution of the number of Indians in California is to be ascribed. The ships of war commissioned to carry the vaccine matter into America and Asia arrived at Vera Cruz shortly after my arrival.

Don Antonio Valmis, physician general of this expedition, visited Portorico, Cuba, Mexico, and the Philippine islands; and his stay at Mexico, where nevertheless the cow-pox was known before his arrival, contributed singularly to facilitate the propagation of this salutary preservative. In the principal cities of the kingdom vaccine committees were formed (*juntas centrales*), composed of the most enlightened individuals, who, by vaccinating monthly, preserve the miasma from being lost. It is so much the less liable to be lost, as it exists in the country. M. *Valmis* discovered it

in the environs of Valladolid, and in the village of Atlisco, near la Puebla, in the udders of the Mexican cows. The commission having fulfilled the beneficent views of the king of Spain, we may indulge a hope that through the influence of the clergy, and especially of the religious missionaries, vaccination will be gradually introduced into the very interior of the country. The voyage of M. Valmis will thus remain for ever memorable in the annals of history. The Indies saw for the first time those vessels, which were formerly freighted only with instruments of carnage and destruction, bearing about the germ of relief and consolation to distressed and suffering humanity.

The arrival of the armed frigates in which M. Valmis made the circuit of the Atlantic and Pacific Oceans gave rise on several coasts to one of the most simple, and therefore most affecting, ceremonies. The bishops, military governors, and persons of greatest distinction, repaired to the shore, where they took in their arms the children who were to carry the cow-pox to the indigenous Americans and the Malays of the Philippine islands, and, followed with public acclamations, they laid at the foot of the altar those precious preservative deposits, returning thanks to the Supreme Being for having been the witnesses of so happy an event. We must have some knowledge of the ravages occasioned by the small-pox in the torrid zone, and especially among a race of men whose

physical constitution seems adverse to cutaneous eruptions, in order to feel all the importance of M. Jenner's discovery. It is a much greater blessing for the equinoxial part of the new continent than for the temperate climate of the old.

It may be useful to relate here a fact of some importance for those who take an interest in the progress of vaccination. It was unknown at Lima till the month of November 1802. At that period the small-pox prevailed on the coast of the South Sea. A merchant vessel, *Santo Domingo de la Calzada*, put into Lima in the passage from Spain to Manilla. An individual had had the good sense to send by this vessel vaccine matter to the Philippine islands. They availed themselves of this opportunity at Lima; and M. Unanue, professor of anatomy, and author of an excellent physiological treatise on the climate of Peru*, vaccinated several individuals by means of the matter brought by the merchant vessel. No pustule appeared; and the virus appeared either altered or too weak. However, M. Unanue having observed that all the vaccinated individuals had a very mild small-pox, employed this variolous mat-

* This work, which displays an intimate acquaintance with the French and English literature, bears the title of *Observaciones sobre el clima de Lima y sus influencias en los seres organizados en especial el hombre, por el Dr. D. Hipolito Unanue.* Lima, 1806.

ter to render, if possible by the ordinary inoculation, the disease less fatal. He thus perceived in an indirect way the effects of a vaccination supposed to have failed.

It was accidentally discovered in the course of the same epidemic in 1802, that the beneficent effect of vaccination had been long known to the country people among the Peruvian Andes. A negro slave had been inoculated for the small-pox in the house of the Marquis de Valleumbroso who showed no symptom of the disease. They were going to repeat the inoculation, when the young man told them that he was certain of never having the small-pox, because in milking cows in the Cordillera of the Andes, he had had a sort of cutaneous eruptions, caused, as the Indian herdsmen said, by the contact of certain tubercules sometimes found on the udders of cows. Those who have had this eruption, said the negro, never take the small-pox. The Africans, and especially the Indians, display great sagacity in observing the character, habits, and diseases of the animals with which they live. We need not therefore be astonished, that, on the introduction of horned cattle into America, the lower people remarked that the pustules on the udders of cows communicated to the herdsmen a species of benignant small-pox, and that those once infected are secure from the general contagion during the epochs when the disease is epidemical.

The *matlazahuatl*, a disease peculiar to the Indian race, seldom appears more than once in a century. It raged in a particular manner in 1545, 1576, and 1736. It is called a plague by the Spanish authors. As the latest epidemic took place at a time when medicine was not considered a science, even in the capital, we have no exact data as to the *matlazahuatl*. It bears certainly some analogy to the yellow fever or black vomiting; but it never attacks white people, whether Europeans or descendants from the natives. The individuals of the race of Caucasus * do not appear subject to this mortal typhus, while, on the other hand, the yellow fever or black vomiting very seldom attacks the Mexican Indians. The principal site of the *vomito prieto* is the maritime region, of which the climate is excessively warm and humid; but the *matlazahuatl* carries terror and destruction into the very interior of the country, to the central table-land, and the coldest and most arid regions of the kingdom.

Father Torribio a Franciscan, better known by

* Who are the individuals of the race of Caucasus? The Europeans. So at least we learn from the context where they are opposed to the Mexican Indians. This involves the theory of the mountains of Asia being the nursery of the old continent. Every one however will not so easily be able to understand Europeans by this denomination. Such attempts to elevate the style, at the expense of perspicuity, can never enough be reprobated. *Trans.*

his Mexican name of Motolinia, asserts that the small-pox at its introduction in 1520, by a negro slave of Narvaez, carried off the half of the inhabitants of Mexico. Torquemada advances the hazardous opinion that in the two *matlazahuatl* epidemics of 1545 and 1576, 800,000 Indians died in the former and 2,000,000 in the latter. But when we reflect on the difficulty with which we can at this day estimate, in the eastern part of Europe, the number of those who fall victims to the plague, we shall very reasonably be inclined to doubt if the viceroys Mendoza and Almanza, governors of a recently conquered country, were able to procure an enumeration of the Indians cut off by the *matlazahuatl*. I do not accuse the two monkish historians of want of veracity; but there is very little probability that their calculation is founded on exact data.

A very interesting problem remains to be resolved. Was the pest, which is said to have desolated from time to time the Atlantic regions of the United States before the arrival of the Europeans, and which the celebrated Rush and his followers look upon as the principle of the yellow fever, identical with the *matlazahuatl* of the Mexican Indians? We may hope that this last disease, should it ever re-appear in New Spain, will be hereafter carefully observed by the physicians.

A third obstacle to the progress of population in New Spain, and perhaps the most cruel of all,

is famine. The American Indians, like the inhabitants of Hindostan, are contented with the smallest quantity of aliment on which life can be supported, and increase in number without a proportional increase in the means of subsistence. Naturally indolent, from their fine climate and generally fertile soil, they cultivate as much maize, potatoes, or wheat as is necessary for their own subsistence, or at most for the additional consumption of the adjacent towns and mines. Agriculture, it is true, has made great progress within the last twenty years; but the consumption has also increased in an extraordinary manner from the augmentation of population, and an excessive luxury formerly unknown to the mixed casts, and from the working of a great number of new seams, which require additional men, horses, and mules. Few hands, no doubt, are employed in manufactures in New Spain; but a great number are withdrawn from agriculture from the necessity of transporting on mules goods and the produce of the mines, iron, powder, and mercury from the coast to the capital, and from thence to the mines along the ridge of the Cordilleras.

Thousands of men and animals pass their lives on the great roads between Vera Cruz and Mexico, Mexico and Acapulco, Oaxaca and Durango, and the cross roads by which provisions are carried to the habitations established in arid and uncultivated regions. This class of inhabitants,

called by the economists in their system, sterile and nonproductive, is consequently more numerous in America than might be expected in a country where manufacturing industry is yet so little advanced. The want of proportion between the progress of population and the increase of food from cultivation renews the afflicting spectacle of famine, whenever a great drought or any other local cause has damaged the crop of maize. Scarcity of provisions has always been accompanied in all times and all parts of the globe with epidemical diseases fatal to population *. The want of nourishment in 1784 gave rise to *asthenical* diseases among the most indigent class of the people. These accumulated calamities cut off a great number of adults, and a still greater number of children; and it was computed that in the town and mines of Guanaxuato more that 8000 individuals perished. A very remarkable meteorological phenomenon contributed principally to the scarcity: the maize, after an extraordinary drought, was nipt by frost on the

* This position requires qualification. Dr. Smith has, I believe, well remarked that in years of scarcity there are, perhaps, fewer diseases and deaths than usual, from the diminished consumption of spirituous liquors by the common people, one of the most productive sources of disease. The position will undoubtedly, however, hold with regard to a Hindoo or Indian population, who in years of plenty have no more than merely supports animal life, and to whom, therefore, any reduction must always prove fatal. *Trans.*

night of the 28th August, and, what is more singular, at an elevation of 1800 metres *. The number of inhabitants carried off by this fatal union of famine and disease throughout the whole surface of the kingdom was estimated at more than 300,000. This number will appear the less astonishing to us when we consider, that even in Europe the population is sometimes diminished by scarcity, more than it is augmented by the excess of births above the deaths for four consecutive years. There perished in Saxony, for example, in 1772, near 66,000 inhabitants, while the excess of births above the deaths was not, *communibus annis*, from 1764 to 1784 more than 17,000 †.

The effects of famine are common to almost

* 5904 feet. *Trans.*

† The translator is afraid that this number of 66,000 includes the whole deaths of Saxony in 1772, in which case the statement that the diminution of population from the famine exceeded the augmentation from the excess of births for four consecutive years will fall to the ground. Every one knows that it is impossible to state exactly the number of deaths from famine in any country, as literally few or none die of famine, but of diseases occasioned by a defective diet, which can never be separated in any bill of mortality from diseases owing to other causes. The nearest approximation, however, is to be found by deducting the average mortality from the increased mortality in any given year of scarcity. I think it extremely probable that M. de Humboldt has not adopted this method. He elsewhere states that the adjacent country of Prussia had, in 1802, on a population of nine millions, 282,100 deaths. If we take Mr. Pinkerton's estimate of the Saxon population,

all the equinoxial regions. In the province of New Andalusia in South America I have seen villages whose inhabitants were forced by famine to disperse themselves from time to time in the deserts to pick up a subsistence from the wild plants. In vain the missionaries employ their authority to prevent this dispersion. In the province *de los Pastos*, the Indians when the potatoes fail, which are their principal nourishment, repair sometimes to the most elevated ridge of the Cordillera to subsist on the juice of the achupallas, a plant related to the genus pitcarnia. The Otomacks at Uruana, on the banks of the Orinoco, swallow, during several months, potter's earth, to absorb by this load the gastric juice, and to satisfy, in some sort, the hunger which torments them *. In the islands of the South Sea, in a fertile soil, where nature has lavished all her blessings, the inhabitants are frequently driven by famine to devour one another. Under the torrid zone, where a beneficent hand seems every where to have scattered the germ of abundance, man, careless and phlegmatic, experiences pe-

2,104,000, say, however, 2,000,000, and assume a mortality for it proportionate to that of Prussia, we shall find the number of deaths 62,869. If, supposing then 66,000 the mortality of 1772, and 62,869 the average mortality, the increase by famine in 1772 would only be 3311. This is a much more likely number than the enormous one given by M. de Humboldt; but the fact can easily be ascertained. *Trans.*

* See my *Tableaux de la Nature*, t. I. p. 62, 191, and 209.

riodically a want of nourishment which the industry of more civilized nations banishes from the most sterile regions of the north.

The working of the mines has long been regarded as one of the principal causes of the depopulation of America. It will be difficult to call in question, that at the first epoch of the conquest, and even in the seventeenth century, many Indians perished from the excessive labour to which they were compelled in the mines. They perished without posterity, as thousands of African slaves annually perish in the West Indian plantations from fatigue, defective nourishment, and want of sleep. In Peru, at least in the most southern part, the country is depopulated by the mines, because the barbarous law of the *mita* is yet in existence, which compels the Indians to remove from their homes into distant provinces, where hands are wanted for extracting the subterraneous wealth. But it is not so much the labour as the sudden change of climate, which renders the mita so pernicious to the health of the Indians. This race of men has not the flexibility of organization for which the Europeans are so eminently distinguished. The health of copper-coloured man suffers infinitely when he is transported from a warm to a cold climate, particularly when he is forced to descend from the elevation of the Cordillera into those narrow and humid

vallies, where all the miasmata of the neighbouring regions appear to be deposited.

In the kingdom of New Spain, at least within the last thirty or forty years, the labour of the mines is free; and there remains no trace of the *mita*, though a justly celebrated author* has advanced the contrary. No where does the lower people enjoy in greater security the fruit of their labours than in the mines of Mexico; no law forces the Indian to choose this species of labour, or to prefer one mine to another; and when he is displeased with the proprietor of the mine, he may offer his services to another master who may pay perhaps more regularly. These unquestionable facts are very little known in Europe. The number of persons employed in subterraneous operations, who are divided into several classes (*Barenadores, Faeneros, Tenateros, Bareteros*), does not exceed in the whole kingdom of New Spain 28 or 30,000. Hence there is not more than $\frac{1}{200}$ of the whole population immediately employed in the mines.

The mortality among the miners of Mexico is not much greater than what is observed among the other classes. We may easily be convinced of this by examining the bills of mortality in the different parishes of Guanaxuato and Zacatecas.

* Robertson, History of America, vol. ii. p. 373.

This is a phenomenon, so much the more remarkable, as the miner in several of these mines is exposed to a temperature 6° above the mean temperatures of Jamaica and Pondicherry*. I found the centigrade thermometer at 34° † at the bottom of the mine of Valenciana (*en los planes*), a perpendicular depth of 513 metres ‡, while at the mouth of the pit in the open air, the same thermometer sinks in winter to 4° or 5° § above 0. The Mexican miner is, consequently, exposed to a change of temperature of more than 30° ‖ But this enormous heat of the Valenciana mine is not the effect of a great number of men and lights collected into a small space; it is much more owing to local and geological causes which we shall afterwards examine.

It is curious to observe how the Mestizoes and Indians employed in carrying minerals on their back, who go by the name of *Tenateros*, remain continually loaded for six hours with a weight of from 225 to 350 pounds, and constantly exposed to a very high temperature, ascending eight or ten times successively, without intermission, stairs of 1800 steps. The appearance of these robust and laborious men would have operated a change in the opinions of the Raynals and Pauws, and a

* Nearly 11° of Fahrenheit. *Trans.*

† 93° of Fahrenheit. *Trans.* ‡ 1681 feet. *Trans.*

§ 39° or 41° of Fahrenheit. *Trans.*

‖ 54° of Fahrenheit. *Trans.*

number of other authors, however estimable in other respects, who have been pleased to declaim against the degeneracy of our species in the torrid zone. In the Mexican mines, children (*enfans*) of seventeen years of age* are able to carry masses of stone of a hundred pounds weight. This occupation of Tenateros is accounted unhealthy, if they enter more than three times a week into the mines. But the labour which ruins most rapidly the robustest constitutions is that of the *Barenadores*, who blow up the rock with powder. These men rarely pass the age of 35, if from a thirst of gain they continue their severe labour for the whole week. They generally pass no more than five or six years at this occupation, and then betake themselves to other employments less injurious to health.

The art of mining is daily improving, and the pupils of the school of mines at Mexico gradually diffuse correct notions respecting the circulation of air in pits and galleries. Machines are beginning to be introduced in place of the old method of

* I should be inclined to think that the author meant here to say *enfans de sept à dix ans*, instead of *enfans de dix sept ans*; for *enfant*, it is believed, can hardly be applied with propriety to a youth of 17; and if a full-grown man could ascend eight or ten times, without intermission, 1800 steps of a stair with 350 pounds, it certainly could not add to the evidence of the strength of this race to say, that a young man of 17 could carry little more than the fourth part of that weight. *Trans.*

carrying minerals and water on men's backs up stairs of a rapid ascent. In proportion as the mines of New Spain resemble more and more those of Freiberg, Clausthal, and Schemnitz, the miner's health will be less injured by the influence of the *Mofettes**, and the excessively prolonged efforts of muscular motion.

From five to six thousand persons are employed in the amalgamation of the minerals, or the preparatory labour. A great number of these individuals pass their lives in walking barefooted over heaps of brayed metal, moistened and mixed with muriate of soda, sulphate of iron, and oxid of mercury, by the contact of the atmospheric air and the solar rays. It is a remarkable phenomenon to see these men enjoy the most perfect health. The physicians who practise in places where there are mines unanimously assert, that the nervous affections, which might be attributed to the effect of an absorption of oxid of mercury, very rarely occur. At Guanaxuato part of the inhabitants drink the very water in which the amalgamation has been purified *(aqua de lavaderos)* without feeling any injury from it. This fact has often struck Europeans not intimately acquainted with the principles of chemistry. The water is at first of a greyish-blue colour, and contains in suspension

* The translator professes his ignorance of the meaning of this word.

black oxid of mercury, and small globules of native mercury and amalgamation of silver. This metallic mixture gradually precipitates, and the water becomes limpid. It can neither dissolve the oxid of mercury nor the muriate of mercury, which is one of the most insoluble salts which we know. The mules are very fond of this water, because it contains a little muriate of soda in dissolution.

In speaking of the progress of the Mexican population, and of the causes which retard that progress, I have neither mentioned the arrival of new European colonists, nor the mortality occasioned by the *black vomiting*. We shall discuss these subjects in the sequel. It is sufficient to observe here, that the *vomito prieto* is a scourge which is never felt but on the coast, and which does not, throughout the whole kingdom, carry off annually more than from two to three thousand individuals. As to Europe, it does not send more than 800 to Mexico. Political writers have always exaggerated what they call the depopulation of the old continent by the new. M. Page*, for example, asserts in his work on the commerce of St. Domingo that the emigrations from Europe supply annually more than 100,000 individuals to the United States. This estimate is twenty times higher than the truth; for, in 1784 and 1792, when the United

* Vol. II. p. 427.

States received the greatest number of European colonists, their number did not exceed 5000 *. The progress of population in Mexico and North America is solely derived from an increase of internal prosperity.

† Samuel Blodget's Economica, 1806, p. 58.

CHAPTER VI.

Diversity of casts.—Indians or indigenous Americans.—Their number and their migrations.—Diversity of languages.—Degree of civilization of the Indians.

THE Mexican population is composed of the same elements as the other Spanish colonies. They reckon seven races: 1. The individuals born in Europe, vulgarly called *Gachupines;* 2. the Spanish Creoles, or whites of European extraction born in America; 3. the *Mestizos*, descendants of whites and Indians; 4. the Mulattos, descendants of whites and negros; 5. the *Zambos*, descendants of negros and Indians; 6. the Indians, or copper-coloured indigenous race; and 7. the African negros. Abstracting the subdivisions there are four casts: the whites, comprehended under the general name of Spaniards, the negros, the Indians, and the men of mixed extraction, from Europeans, Africans, American Indians, and Malays; for from the frequent communication between Acapulco and the Philippine islands, many individuals of Asiatic origin, both Chinese and Malays, have settled in New Spain.

A very general prejudice exists in Europe that an exceeding small number of the copper-coloured race, or descendants of the ancient Mexicans, remain at this day. The cruelty of the Europeans has entirely extirpated the old inhabitants of the West Indies. The continent of America, however, has witnessed no such horrible result. The number of Indians in New Spain exceeds two millions and a half, including only those who have no mixture of European or African blood. What is still more consolatory, and we repeat it, is, that the indigenous population, far from declining, has been considerably on the increase for the last fifty years, as is proved by the registers of capitation or tribute.

In general the Indians appear to form two-fifths of the whole population of Mexico. In the four intendancies of Guanaxuato, Valladolid, Oaxaca, and la Puebla, this population amounts even to three-fifths. The enumeration of 1793 gave the following result.

Names of intendancies.	*Total population.*	*Number of Indians.*
Guanaxuato	398,000	175,000
Valladolid	290,000	119,000
Puebla	638,000	416,000
Oaxaca	411,000	363,000

From this table it appears that in the intendancy of Oaxaca, of 100 individuals 88 were Indians.

So great a number of indigenous inhabitants undoubtedly proves the antiquity of the cultivation of this country. Accordingly, we find near Oaxaca remaining monuments of Mexican architecture, which prove a singularly advanced state of civilization.

The Indians, or copper-coloured race, are rarely to be found in the north of New Spain, and are hardly to be met with in the *provincias internas.* History gives us several causes for this phenomenon. When the Spaniards made the conquest of Mexico, they found very few inhabitants in the countries situated beyond the parallel of 20°. These provinces were the abode of the Chichimecks and Otomites, two pastoral nations, of whom thin hordes were scattered over a vast territory. Agriculture and civilization, as we have already observed, were concentrated in the plains south of the river of Santiago, especially between the valley of Mexico and the province of Oaxaca.

From the 7th to the 13th century, population seems in general to have continually flowed towards the south From the regions situated to the north of the Rio Gila issued forth those warlike nations who successively inundated the country of Anahuac. We are ignorant whether that was their primitive country, or whether they came originally from Asia or the north-west coast of America, and traversed the savannas of Nabajoa and Moqui, to arrive at the Rio Gila. The hieroglyphical

tables of the Aztecs have transmitted to us the memory of the principal epochs of the great migrations among the Americans. This migration bears some analogy to that which, in the fifth century, plunged Europe in a state of barbarism, of which we yet feel the fatal effects in many of our social institutions. However, the people who traversed Mexico left behind them traces of cultivation and civilization. The Toultecs appeared, first, in the year 648, the Chichimecks in 1170, the Nahualtecs in 1178, the Acolhues and Aztecs in 1196. The Toultecs introduced the cultivation of maize and cotton; they built cities, made roads, and constructed those great pyramids which are yet admired, and of which the faces are very accurately laid out. They knew the use of hieroglyphical paintings; they could found metals, and cut the hardest stones; and they had a solar year more perfect than that of the Greeks and Romans. The form of their government indicated that they were the descendants of a people who had experienced great vicissitudes in their social state. But where is the source of that cultivation? where is the country from which the Toultecs and Mexicans issued?

Tradition and historical hieroglyphics name Huehuetlapallan, Tollan, and Aztlan, as the first residence of these wandering nations. "There are no remains at this day of any ancient civilization of the human species to the north of the Rio Gila,

or in the northern regions travelled through by Hearne, Fidler, and Mackenzie. But on the north-west coast, between Nootka and Cook river, especially under the 57° of north latitude, in Norfolk Bay and Cox Canal, the natives display a decided taste for hieroglyphical paintings*. M. Fleurieu, a man of distinguished learning, supposes that these people might be the descendants of some Mexican colony, which, at the period of the conquest, took refuge in those northern regions. This ingenious opinion will appear less probable if we consider the great distance which these colonists would have to travel, and reflect that the Mexican cultivation did not extend beyond the 20° of latitude. I am rather inclined to believe, that, on the migration of the Toultecs and Aztecs to the south, some tribes remained on the coasts of New Norfolk and New Cornwall, while the rest continued their course southwards. We can conceive how people, travelling *en masse*, for example, the Ostrogoths and Alani, were able to pass from the Black Sea into Spain; but how could we believe that a portion of these people were able to return from west to east, at an epoqua when other hordes had already occupied their first abodes on the banks of the Don or the Boristhenes?

* *Voyage de Marchand, tom.* I. p. 258, 261, 375; *Dixon*, p. 332. A harp represented in the hieroglyphical paintings of the inhabitants of the north-west coast of America, is an object at least as remarkable as the famous harp on the tombs of the kings of Thebes.

This is not the place to discuss the great problem of the Asiatic origin of the Toultecs or Aztecs. The general question of the first origin of the inhabitants of a continent is beyond the limits prescribed to history; and is not, perhaps, even a philosophical question. There undoubtedly existed other people in Mexico at the time when the Toultecs arrived there in the course of their migration, and therefore to assert that the Toultecs are an Asiatic rate is not maintaining that all the Americans came originally from Thibet or oriental Siberia. De Guignes attempted to prove by the Chinese annals that they visited America posterior to 458; and Horn, in his ingenious work *de Originibus Americanis*, published in 1699, M. Scherer, in his historical researches respecting the new world, and more recent writers, have made it appear extremely probable that old relations existed between Asia and America.

I have elsewhere advanced* that the Toultecs, or Aztecs, might be a part of those Hiongnoux, who, according to the Chinese historians, emigrated under their leader Punon, and were lost in the north parts of Siberia. This nation of warrior-shepherds has more than once changed the face of oriental Asia, and desolated under the name of Huns the finest parts of civilized Europe. All these conjectures will acquire more probability

* Tableaux de la Nature, vol. I. p. 53.

when a marked analogy shall be discovered between the languages of Tartary and those of the new continent; an analogy, which, according to the latest researches of M. Barton Smith, extends only to a very small number of words. The want of wheat, oats, barley, rye, and all those nutritive gramina which go under the general name of cereal, seems to prove, that if Asiatic tribes passed into America, they must have descended from pastoral people. We see in the old continent that the cultivation of cereal gramina, and the use of milk, were introduced as far back as we have any historical records. The inhabitants of the new continent cultivated no other gramina than maize (*Zea*). They fed on no species of milk, though the lamas, alpacas, and in the north of Mexico and Canada two kinds of indigenous oxen, would have afforded them milk in abundance. These are striking contrasts between the Mongol and American race.

Without losing ourselves in suppositions as to the first country of the Toultecs and the Aztecs, and without attempting to fix the geographical position of those ancient kingdoms of Huehuetlapallan and Aztlan, we shall confine ourselves to the accounts of the Spanish historians. The northern provinces, New Biscay, Sonora, and New Mexico, were very thinly inhabited in the 16th century. The natives were hunters and shepherds; and they withdrew as the European conquerors

advanced towards the north. Agriculture alone attaches man to the soil, and develops the love of country. Thus we see that in the southern part of Anahuac, in the cultivated region adjacent to Tenochtitlan, the Aztec colonists patiently endured the cruel vexations exercised towards them by their conquerors, and suffered every thing rather than quit the soil which their fathers had cultivated. But in the northern provinces, the natives yielded to the conquerors their uncultivated savannas, which served for pasturage to the buffaloes. The Indians took refuge beyond the Rio Gila, towards the Rio Zaguanas and the mountains de las Grullas. The Indian tribes who formerly occupied the territory of the United States and Canada followed the same policy; and chose rather to withdraw, first, behind the Alleghany mountains, then behind the Ohio, and lastly behind the Missoury, to avoid being forced to live among the Europeans. From the same cause we find the copper-coloured race neither in the *provincias internas* of New Spain, nor in the cultivated parts of the United States.

The migrations of the American tribes having been constantly carried on from north to south, at least between the sixth and twelfth centuries, it is certain that the Indian population of New Spain must be composed of very heterogeneous elements. In proportion as the population flowed towards

the south, some tribes would stop in their progress, and mingle with the tribes which followed them. The great variety of languages still spoken in the kingdom of Mexico proves a great variety of races and origin.

The number of these languages exceeds twenty, of which fourteen have grammars and dictionaries tolerably complete. The following are their names: the Mexican or Aztec language; the Otomite; the Tarasc; the Zapotec; the Mistec; the Maye, or Yucatan; the Totonac; the Popoluc; the Matlazing; the Huastec; the Mixed; the Caquiquel; the Taraumar; the Tepehuan; and the Cora. It appears that the most part of these languages, far from being dialects of the same as some authors have falsely advanced), are at least as different from one another as the Greek and the German, or the French and Polish. This is the case at least with the seven languages of New Spain, of which I possess the vocabularies. The variety of idioms spoken by the people of the new continent, and which, without the least exaggeration, may be stated at some hundreds, offers a very striking phenomenon, particularly when we compare it with the few languages spoken in Asia and Europe.

The Mexican language, that of the Aztecs, is the most widely diffused, and extends at present from the 37° to the lake of Nicaragua, for a length of

400 leagues. The Abbe Clavigero* has proved that the Toultecs, the Chichimecks (from whom the inhabitants of Tlascala are descended), the Acolhues, and the Nahuatlacs, all spoke the same language as the Mexicans. This language is not so sonorous† but almost as diffused and as rich as that of the Incas. After the Mexican or Aztec language, of which there exists eleven printed grammars, the most general language of New Spain is that of the Otomites.

I could not fail to interest the reader by a minute description of the manners, character, and physical and intellectual state of those indigenous inhabitants of Mexico, which the Spanish laws designate by the name of Indians. The general interest displayed in Europe for the remains of the primitive population of the new continent has its origin in a moral cause, which does honour to humanity. The history of the conquest of America and Hindostan presents the picture of an unequal struggle between nations far advanced in arts, and others in the very lowest degree of civilization. The unfortunate race of Aztecs escaped from the carnage appeared destined to annihilation, under an oppression of several centuries. We have difficulty in believing that nearly two millions

* Clavigero, t. I. p. 153.

† The word *Notlazomahuiztespixcatatzin* signifies, venerable priest whom I cherish as my father. The Mexicans use this word of 27 letters when speaking to the priests (*curés*).

and a half of aborigines could survive such lengthened calamities. The inhabitant of Mexico and Peru, and the Indian of the Ganges, attract in a very different manner from the Chinese or Japanese the attention of an observer endowed with sensibility. Such is the interest which the misfortune of a vanquished people inspires, that it renders us frequently unjust towards the descendants of the conquerors.

To give an accurate idea of the indigenous inhabitants of New Spain, it is not enough to paint them in their actual state of degradation and misery; we must go back to a remote period, when, governed by its own laws, the nation could display its proper energy; and we must consult the hieroglyphical paintings, buildings of hewn stone, and works of sculpture still in preservation, which, though they attest the infancy of the arts, bear, however, a striking analogy to several monuments of the most civilized people. These researches are reserved for the historical account of our expedition to the tropics. The nature of this work does not permit us to enter into such details, however interesting they may be, both for the history and the psychological study of our species. We shall merely point out here a few of the most prominent features of the immense picture of American indigenous population.

The Indians of New Spain bear a general resemblance to those who inhabit Canada, Florida,

Peru, and Brasil. They have the same swarthy and copper colour, flat and smooth hair, small beard, squat body, long eye, with the corner directed upwards towards the temples, prominent cheek bones, thick lips, and an expression of gentleness in the mouth, strongly contrasted with a gloomy and severe look. The American race, after the hyperborean race, is the least numerous; but it occupies the greatest space on the globe. Over a million and a half of square leagues, from the Terra del Fuego islands to the river St. Laurence and Baring's straits, we are struck at the first glance with the general resemblance in the features of the inhabitants. We think we perceive that they all descend from the same stock, notwithstanding the enormous diversity of language which separates them from one another. However, when we reflect more seriously on this family likeness, after living longer among the indigenous Americans, we discover that celebrated travellers, who could only observe a few individuals on the coasts, have singularly exaggerated the analogy of form among the Americans.

Intellectual cultivation is what contributes the most to diversify the features. In barbarous nations there is rather a physiognomy peculiar to the tribe or horde than to any individual. When we compare our domestic animals with those which inhabit our forests we make the same observation. But an European, when he decides on the great re-

semblance among the copper-coloured races, is subject to a particular illusion. He is struck with a complexion so different from our own, and the uniformity of this complexion conceals for a long time from him the diversity of individual features. The new colonist can hardly at first distinguish the indigenous; because his eyes are less fixed on the gentle melancholic or ferocious expression of the countenance than on the red coppery colour and dark luminous and coarse and glossy hair, so glossy indeed that we should believe it to be in a constant state of humectation.

In the faithful portrait which an excellent observer, M. Volney, has drawn of the Canada Indians, we undoubtedly recognize the tribes scattered in the meadows of the Rio Apure and the Carony. The same stile of feature exists no doubt in both Americas; but those Europeans who have sailed on the great rivers Orinoco and Amazons, and have had occasion to see a great number of tribes assembled under the monastical hierarchy in the missions, must have observed that the American race contains nations whose features differ as essentially from one another, as the numerous varieties of the race of Caucasus, the Circassians, Moors, and Persians differ from one another. The tall form of the Patagonians, who inhabit the southern extremity of the new continent, is again found by us, as it were, among the Caribs who dwell in the plains from the Delta of the Orinoco

to the sources of the Rio Blanco. What a difference between the figure, physiognomy, and physical constitution of these Caribs*, who ought to be accounted one of the most robust nations on the face of the earth, and are not to be confounded with the degenerate *Zambos*, formerly called Caribs in the island St. Vincent, and the squat bodies of the Chayma Indians of the province of Cumana! What a difference of form between the Indians of Tlascala and the Lipans and Chichimecs of the northern part of Mexico!

The Indians of New Spain have a more swarthy complexion than the inhabitants of the warmest climates of South America. This fact is so much the more remarkable, as in the race of Caucasus, which may be also called the European Arab race, the people of the south have not so fair a skin as those of the north. Though many of the Asiatic nations who inundated Europe in the sixth century had a very dark complexion, it appears, however, that the shades of colour observable among the white race are less owing to their origin or mixture than to the local influence of the climate. This influence appears to have almost no effect on the

* The great nation of the Caribs, or Caraibs, who, after having exterminated the Cabres, conquered a considerable part of South America, extended in the 16th century from the equator to the Virgin Islands. The few families who existed in our times in the Caribbee Islands, recently transported by the English, were a mixture of true Caribs and negros.

Americans and negros. These races, in which there is an abundant deposition of carburetted hydrogen in the *corpus mucosum* or *reticulatum* of Malpighi, resist in a singular manner the impressions of the ambient air. The negros of the mountains of Upper Guinea are not less black than those who live on the coast. There are, no doubt, tribes of a colour by no means deep among the Indians of the new continent, whose complexion approaches to that of the Arabs or Moors. We found the people of the Rio Negro swarthier than those of the Lower Orinoco, and yet the banks of the first of these rivers enjoy a much cooler climate than the more northern regions. In the forests of Guiana, especially near the sources of the Orinoco, are several tribes of a whitish complexion, the Guaicas, Guajaribs, and Arigues, of whom several robust individuals, exhibiting no symptom of the asthenical malady which characterises *albinos*, have the appearance of true Mestizoes. Yet these tribes have never mingled with Europeans, and are surrounded with other tribes of a dark brown hue. The Indians in the torrid zone who inhabit the most elevated plains of the Cordillera of the Andes, and those who under the 45° of south latitude live by fishing among the islands of the archipelago of Chonos, have as coppery a complexion as those who under a burning climate cultivate bananas in the narrowest and deepest vallies of the equinoxial region. We must add, that the Indians of the

mountains are clothed, and were so long before the conquest, while the aborigines who wander over the plains go quite naked, and are consequently always exposed to the perpendicular rays of the sun. I could never observe that in the same individual those parts of the body which were covered were less dark than those in contact with a warm and humid air. We every where perceive that the colour of the American depends very little on the local position in which we see him. The Mexicans, as we have already observed, are more swarthy than the Indians of Quito and New Grenada, who inhabit a climate completely analogous; and we even see that the tribes dispersed to the north of the Rio Gila are less brown than those in the neighbourhood of the kingdom of Guatimala. This deep colour continues to the coast nearest to Asia. But under the 54° 10′ of north latitude, at Cloak-bay, in the midst of copper-coloured Indians with small long eyes, there is a tribe with large eyes, European features, and a skin less dark than that of our peasantry. All these facts tend to prove that notwithstanding the variety of climates and elevations inhabited by the different races of men, nature never deviates from the model of which she made selection thousands of years ago.

My observations on the innate colour of the aborigines differ in part from the assertions of Michikinakoua, the celebrated chief of the Miamis,

called by the Anglo-Americans *little crook-back* (Petite-Tortue), who communicated so much valuable information to M. Volney. He asserted "that the children of the Canada Indians were born as white as Europeans; that the adults are darkened by the sun, and the grease and the juices of herbs with which they rub their skin; and that that part of the waist of the females which is perpetually covered is always white*." I have never seen the Canada nations of which the chief of the Miamis speaks; but I can affirm that in Peru, Quito, on the coast of Caraccas, the banks of the Orinoco, and in Mexico, the children are never born white, and that the Indian Caciques, who enjoy a certain degree of ease in their circumstances, and who remain clothed in the interior of their houses, have all the parts of their body (with the exception of the hollow of their hand and the sole of their foot) of the same brownish red or coppery colour †.

* *Volney, Tableau du climat et du Sol des Etats-Unis*, vol. ii. p. 435.

† This account of little crook-back is partly confirmed by Father Gumilla, who says that the Indians remain white for several days after they are born, with the exception of a small spot, *acia la parte posterior de la cintura*, of an obscure colour. I have seen and examined that spot, says he, repeatedly. "Al nacer aquellos niños son blancos por algunos dias. Nacen los Indiecillos con una mancha acia la parte posterior de la cintura, de color obscuro, con viso de entre morado y pardo, la qual se va desvaneciendo, al passo que la criatura va perdiendo el color

The Mexicans, particularly those of the Aztec and Otomite race, have more beard than I ever saw in any other Indians of South America. Almost all the Indians in the neighbourhood of the capital wear small mustachios; and this is even a mark of the tributary cast. These mustachios, which modern travellers have also found among the inhabitants of the north-west coast of America, are so much the more curious, as celebrated naturalists have left the question undetermined, whether the Americans have naturally no beard and no hair on the rest of their bodies, or whether they pluck them carefully out. Without entering here into physiological details, I can affirm that the Indians who inhabit the torrid zone of South America have generally some beard; and that this beard increases when they shave themselves, of which we have seen examples in the missions of the capuchins of Caripe, where the Indian sextons wish to resemble the monks their masters. But many individuals are born entirely without beard or hair on their bodies.

M. de Galeano, in the account of the last Spanish expedition to the Straits of Magellan *,

blanco, y adquiriendo el suyo natural. Esta seña ò mancha es cierta, y cosa que tengo vista, y examinada repetidas veces: su tamaño es poco mas, ò menos del espacio que occupa un peso duro de nueva fabrica.—*Gumilla, Orinoco illustrado.* Vol. i. p. 82. *Trans.*

* *Viaje al Estrecho de Magellanes*, p. 331.

informs us, that there are many old men among the Patagonians with beards, though they are short, and by no means bushy. On comparing this assertion with the facts collected by Marchand, Mears, and especially M. Volney, in the northern temperate zone, we are tempted to believe that the Indians have more and more beard in proportion to their distance from the equator. However, this apparent want of beard is by no means peculiar to the American race; for many hordes of Eastern Asia, and especially several tribes of African negros, have so little beard that we should be almost tempted to deny entirely its existence. The negros of Congo and the Caribs, two eminently robust races, and frequently of a colossal stature, prove that to look upon a beardless chin as a sure sign of the degeneration and physical weakness of the human species is a mere physiological dream. We forget that all which has been observed in the Caucasian race does not equally apply to the Mongol or American race, or to the African negros.

The Indians of New Spain, those at least subject to the European domination, generally attain a pretty advanced age. Peaceable cultivators, and collected these six hundred years in villages, they are not exposed to the accidents of the wandering life of the hunters and warriors of the Mississipi and the savannas of the Rio Gila. Accustomed to uniform nourishment of an almost entirely vegetable nature, that of their maize and cereal gramina,

the Indians would undoubtedly attain a very great longevity if their constitution were not weakened by drunkenness. Their intoxicating liquors are rum, a fermentation of maize and the root of the jatropha, and especially the wine of the country, made of the juice of the agave americana, called *pulque*. This last liquor, of which we shall have occasion to speak in the following book, is even nutritive, on account of the undecomposed sugar which it contains. Many Indians addicted to *pulque* take for a long time very little solid nourishment. When taken with moderation it is very salutary, and by fortifying the stomach, assists the functions of the gastric system.

The vice of drunkenness is, however, less common among the Indians than is generally believed. Those Europeans who have travelled to the east of the Alleghany mountains, between the Ohio and the Missoury, will with difficulty believe that, in the forests of Guiana, and on the banks of the Orinoco, we saw Indians who shewed an aversion for the brandy which we made them taste. There are several Indian tribes, very sober, whose fermented beverages are too weak to intoxicate. In New Spain drunkenness is most common among the Indians who inhabit the valley of Mexico, and the environs of Puebla and Tlascala, wherever the maguey or agave are cultivated on a great scale. The police in the city of Mexico sends round tumbrils, to collect the drunkards to be found

stretched out in the streets. These Indians, who are treated like dead bodies, are carried to the principal guard-house. In the morning an iron ring is put round their ancles, and they are made to clear the streets for three days. On letting them go on the fourth day, they are sure to find several of them in the course of the week. The excess of liquors is also very injurious to the health of the lower people in the warm countries on the coast which grow sugar-cane. It is to be hoped that this evil will diminish, as civilization makes more progress among a cast of men whose bestiality is not much different from that of the brutes.

Travellers who merely judge from the physiognomy of the Indians are tempted to believe that it is rare to see old men among them. In fact, without consulting parish registers, which in warm regions are devoured by the termites every twenty or thirty years, it is very difficult to form any idea of the age of Indians: they themselves (I allude to the poor labouring Indian) are completely ignorant of it. Their head never becomes grey. It is infinitely more rare to find an Indian than a negro with grey hairs, and the want of beard gives the former a continual air of youth*. The skin of the Indians is also less

* This account differs from that of Ulloa, who says expressly that the symptoms of old age among the Indians are

subject to wrinkles. It is by no means uncommon to see in Mexico, in the temperate zone half way up the Cordillera, natives, and especially women, reach a hundred years of age. This old age is generally comfortable; for the Mexican and Peruvian Indians preserve their muscular strength to the last. While I was at Lima the Indian Hilario Pari died at the village of Chiguata, four leagues distant from the town of Arequipa, at the age of 143. He remained united in marriage for 90 years to an Indian of the name of Andrea Alea Zar, who attained the age of 117. This old Peruvian went, at the age of 130, from three to four leagues daily on foot. He became blind 13 years before his death, and left behind him of 12 children but one daughter, of 77 years of age.

grey hairs and a *beard: pero hay dos scñales que manifiestan quando son de edad muy abanzada: la una las canas, y la otra las barbas.* The whole passage runs thus, "Son per le general de larga vida, aunque dificil de averiguar el numero de sus años; pero hay dos señales que manifiestan quando son de edad muy abanzada; la una las canas, y la otra las barbas: aquellas no empiezcan à parecer hasta que estan en 70 años ò cerca de ellas: estas otras hasta que passan de 60, y siempre son pocas; y asi quando se ven *del todo encanecidos*, y que las pocas barbas le estan igualmente, se jusga que pasan de un siglo." (Noticias Americanas, p. 323.) The accuracy of Ulloa, and the opportunities which he had of observing every variety of Indian race, are very universally known. Father Gumilla gives an account somewhat similar to Ulloa's. *Trans.*

The copper-coloured Indians enjoy one great physical advantage, which is undoubtedly owing to the great simplicity in which their ancestors lived for thousands of years. They are subject to almost no deformity. I never saw a hunchbacked Indian; and it is extremely rare to see any of them who squint, or are lame in the arm or leg. In the countries where the inhabitants suffer from the *goitre*, this affection of the thyroid gland is never observed among the Indians, and seldom among the Mestizoes. Martin Salmeron, the famous Mexican giant, belongs to the last class, though erroneously said to be an Indian, whose height is 2,224 metres, or six feet ten inches, and $2\frac{2}{3}$ lines of Paris *. He is the son of a Mestizo, who married an Indian woman of the village of Chilapa el Grande, near Chilpansingo †.

When we examine savage hunters or warriors we are tempted to believe that they are all well made, because those who have any natural deformity either perish from fatigue or are exposed

* 87,521 inches, or 7 feet $3\frac{1}{2}$ inches. *Trans.*

† Such is the real size of this giant, the best proportioned whom I have ever seen. He is an inch taller than the giant of Torneo, seen at Paris in 1735. The American Gazettes make Salmeron 7 feet 1 inch of Paris measure. *Gazetta de Goatimala*, 1800. *Agosto*, Annales de Madrid, t. IV. No. 12. The human species appears to vary from 2 feet 4 inches to 7 feet 8 inches, or from 0^m, 757 to 2^m, 459. (*Schreber Mamm.* t. I. p. 27.)

by their parents; but the Mexican and Peruvian Indians, those of Quito and New Grenada, are agriculturists, who can only be compared with the class of European peasantry. We can have no doubt then that the absence of natural deformities among them is the effect of their mode of life, and of the constitution peculiar to their race. All the men of very swarthy complexion, those of Mongol and American origin, and especially the negros, participate in the same advantage. We are inclined to believe that the Arab-European race possesses a greater flexibility of organization, and that it is easier modified by a great number of exterior causes, such as variety of aliments, climates, and habits, and consequently has a greater tendency to deviate from its original model.

What we have been stating as to the exterior form of the indigenous Americans confirms the accounts of other travellers of the striking analogy between the Americans and the Mongol race. This analogy is particularly evident in the colour of the skin and hair, in the defective beard, high cheek bones, and in the direction of the eyes. We cannot refuse to admit that the human species does not contain races resembling one another more than the Americans, Mongols, Mantcheoux, and Malays. But the resemblance of some features does not constitute an *identity* of race. If the hieroglyphical paintings and traditions of the inhabitants of Anahuac, collected by the first con-

querors, appear to indicate that a swarm of wandering tribes spread from the north-west towards the south, we must not therefore conclude that all the Indians of the new continent are of Asiatic origin. In fact, osteology teaches us that the cranium of the American differs essentially from that of the Mongol: the former exhibits a facial line, more inclined, though straighter, than that of the negro; and there is no race on the globe in which the frontal bone is more depressed backwards, or which has a less projecting forehead*. The cheek-bones of the American are almost as prominent as those of the Mongol; but the contours are more rounded, and the angles not so

* This extraordinary flatness is to be found among nations to whom the means of producing artificial deformity are totally unknown, as is proved by the *crania* of Mexican Indians, Peruvians, and Atures, brought over by M. Bonpland and myself, of which several were deposited in the Museum of Natural History at Paris. I am inclined to believe that the barbarous custom which prevails among several hordes of pressing the heads of children between two boards had its origin in the idea that beauty consists in such a form of the frontal bone as to characterise the race in a decided manner. The negros give the preference to the thickest and most prominent lips; the Calmucks to turned-up noses; and the Greeks in the statues of heroes have raised the facial line from 85° to 100° beyond nature. (Cuvier, *Anat. Comparee*, t. II. p. 6.) The Aztecs, who never disfigure the heads of their children, represent their principal divinities, as their hieroglyphical manuscripts prove, with a head much more flattened than any I have ever seen among the Caribs.

sharp. The under jaw is larger than the negros, and its branches are less dispersed than the Mongols. The *occipital bone* is less curved *(bombé)*, and the protuberances which correspond to the cerebellum, to which the system of M. Gall attaches great importance, are scarcely sensible. Perhaps this race of copper-coloured men, comprehended under the general name of American Indians, is a mixture of Asiatic tribes, and the aborigines of this vast continent; and it is not unlikely also that the figures with enormous aquiline noses, observed in the hieroglyphical Mexican paintings preserved at Vienna, Veletri, and Rome, as in my historical fragments, indicated the physiognomy of some races now extinct. The Canadian savages call themselves Metoktheniakes, born of the sun, without allowing themselves to be persuaded of the contrary by the *black robes**, a name which they give to the missionaries.

As to the moral faculties of the Indians, it is difficult to appreciate them with justice, if we only consider this long oppressed cast in their present state of degradation. The better sort of Indians, among whom a certain degree of intellectual culture might be supposed, perished in great part at the commencement of the Spanish conquest, the victims of European ferocity. The Christian fanaticism broke out in a particular manner against the

* Volney, t. II. p. 438.

Aztec priests; and the Teopixqui, or ministers of the divinity, and all those who inhabited the Teocalli *, or houses of God, who might be considered as the depositories of the historical, mythological, and astronomical knowledge of the country, were exterminated; for the priests observed the meridian shade in the gnomons, and regulated the calendar. The monks burned the hieroglyphical paintings, by which every kind of knowledge was transmitted from generation to generation. The people, deprived of these means of instruction, were plunged in an ignorance so much the deeper as the missionaries were unskilled in the Mexican languages, and could substitute few new ideas in the place of the old. The Indian women who had preserved any share of fortune chose rather to ally with the conquerors than to share the contempt in which the Indians were held. The Spanish soldiers were so much the more eager for these alliances, as very few European women had followed the army. The remaining natives then consisted only of the most indigent race, poor cultivators, artisans, among whom were a great number of weavers, porters, who were used like beasts of burden, and especially of those dregs of the people, those crowds of beggars, who bore witness to the imperfection of the social institutions, and the existence of feudal oppression, and who filled, in the time of

* From Teotl, God, Θεος.

Cortez, the streets of all the great cities of the Mexican empire. How shall we judge, then, from these miserable remains of a powerful people, of the degree of cultivation to which it had risen from the twelfth to the sixteenth century, and of the intellectual developement of which it is susceptible? If all that remained of the French or German nation were a few poor agriculturists, could we read in their features that they belonged to nations which had produced a Descartes and Clairaut, a Kepler and a Leibnitz?

We observe that even in Europe the lower people, for whole centuries, make very slow progress in civilization. The peasant of Brittany or Normandy, and the inhabitant of the north of Scotland, differ very little at this day from what they were in the time of Henry the Fourth and James the First*. When we consider attentively what is related in the letters of Cortez, the memoirs of Bernal Diaz, written with admirable naiveté, and other contemporary historians, as to the state of the inhabitants of Mexico, Tezcuco,

* What is here asserted of the highlands of Scotland might have had more foundation fifty years ago. A barren and mountainous country must ever oppose great obstacles to improvement and civilization; but it is believed that these obstacles have seldom been more successfully overcome than in the highlands. Of this abundant proof might be found in the statistical account of Scotland, did not the high moral character observable in the highland regiments establish it beyond a doubt. *Trans.*

Cholollan, and Tlascala, in the time of Montezuma the Second, we think we perceive the portrait of the Indians of our own time. We see the same nudity in the warm regions, the same form of dress in the central table-land, and the same habits in domestic life. How can any great change take place in the Indians when they are kept insulated in villages in which the whites dare not settle, when the difference of language places an almost unsurmountable barrier between them and the Europeans, when they are oppressed by magistrates chosen through political considerations from their own number, and, in short, when they can only expect moral and civil improvement from a man who talks to them of mysteries, dogmas, and ceremonies, of the end of which they are ignorant?

I do not mean to discuss here what the Mexicans were before the Spanish conquest; this interesting subject has been already entered upon in the commencement of this chapter. When we consider that they had an almost exact knowledge of the duration of the year, that they intercalated at the end of their great cycle of 104 years with more accuracy than the Greeks *, Romans,

* M. Laplace discovered in the Mexican intercalation, for which I furnished him materials collected by Gama, that the duration of the tropical year of the Mexicans is almost the identical duration found by the astronomers of Almamon. For

and Egyptians, we are tempted to believe that this progress is not the effect of the intellectual developement of the Americans themselves, but that they were indebted for it to their communication with some very cultivated nations of central Asia. The Toultecs appeared in New Spain in the 7th, and the Aztecs in the 12th century; and they immediately drew up the geographical map of the country traversed by them, constructed cities, highways, dikes, canals, and immense pyramids very accurately designed, of a base of 438* metres in length. Their feudal system, their civil and military hierarchy, were already so complicated, that we must suppose a long succession of political events before the establishment of the singular concatenation of authorities of the nobility and clergy, and before a small portion of the people, themselves the slaves of the Mexican sultan, could have subjugated the great mass of the nation. We have examples of theocratical forms of government in South America; for such were those of the Zac† of Bogota (the ancient Cundinamarca),

this observation, of such inportance in the history of the origin of the Aztecs, see *Exposition du systeme du Monde, troisieme edition*, p. 554.

* 1436 feet. *Trans.*

† The empire of the Zac, which comprehended the kingdom of New Grenada, was founded by Idacanzas or Bochica, a mysterious personage, who, according to the traditions of the Mozcas, lived in the temple of the sun at Sogamozo during 2000 years.

and of the Inca of Peru, two extensive empires, in which despotism was concealed under the appearance of a gentle and patriarchal government. But in Mexico, small colonies, wearied of tyranny, gave themselves republican constitutions. Now it is only after long popular struggles that these free constitutions can be formed. The existence of republics does not indicate a very recent civilization. How is it possible to doubt that a part of the Mexican nation had arrived at a certain degree of cultivation, when we reflect on the care with which their hieroglyphical books* were composed,

* The Aztec manuscripts are written either on agave paper, or on stag skins; they are frequently from 20 to 22 metres (65 to 71 English feet) in length; and each page contains from 7 to 10 centimetres, or from 100 to 150 square inches (French) of surface. These manuscripts are folded here and there in the form of a rhomb, and thin wooden boards fastened to the extremities form their binding, and give them a resemblance to our books in quarto. No nation of the old continent ever made such an extensive use of hieroglyphical writing; and in none of them do we see real books bound in the way I have been describing. We must not confound with these books other Aztec paintings, composed of the same signs, but in the form of tapestries of 63 decimetres, or 60 square feet (French). I have seen some of them in the archives of the viceroyalty of Mexico; and I myself possess fragments of them, which I have caused to be engraved in the picturesque atlas which accompanies the historical account of my travels. *Author.*

The numbers in the above note are totally irreconcileable with one another. A centimetre is equal to .36941 of a

and when we recollect that a citizen of Tlascala, in the midst of the tumults of war, took advantage of the facility offered him by our Roman alphabet to write in his own language five large volumes on the history of a country of which he deplored the subjection?

We shall not here attempt to resolve the problem, however important it may be for history, whether the Mexicans of the 15th century were more civilized than the Peruvians, or whether, if both had been abandoned to themselves, they would have made more rapid advances towards intellectual cultivation than they have done under the domination of the Spanish clergy. Neither shall we examine whether, notwithstanding the despotism of the Aztec princes, the improvement of the individual found fewer obstacles in Mexico than in the empire of the Yncas. In the latter the legislator wished only to influence the people *en masse;* and by subjecting them to a monastic obedience, and treating them like machines, he compelled them to undertake works, the regularity

French inch, consequently 7 and 10 centimetres are only .0552 and 1.3045 French square inches, and nothing like 100 and 150 square inches. In the same way a decimetre being only as 3.24835 : 12 of a French foot, 63 decimetres make 5.97 and not 60 square feet French. Some mistake must therefore be either in the metrical or common measures here assigned, or in both. *Trans.*

and magnitude of which astonish us as much as the perseverance of those who directed them. If we analyse the mechanism of this Peruvian theocracy, generally too much exalted in Europe, we shall find that wherever people are divided into casts, of which each can only follow a certain species of labour, and wherever the inhabitants possess no particular property, and labour merely for the benefit of the community, canals, roads, aqueducts, pyramids, and immense constructions will also be found; but that the people preserving for thousands of years the same appearance of external comfort make almost no advances in moral cultivation, which is the result of individual liberty alone.

In the portrait which we draw of the different races of men composing the population of New Spain, we shall merely consider the Mexican Indian in his actual state. We perceive in him neither that mobility of sensation, gesture, or feature, nor that activity of mind for which several nations of the equinoxial regions of Africa are so advantageously distinguished. There cannot exist a more marked contrast than that between the impetuous vivacity of the Congo negro, and the apparent flegm of the Indian. From a feeling of this contrast the Indian women not only prefer the negros to the men of their own race, but also to the Europeans. The Mexican Indian is grave,

melancholic, and silent*, so long as he is not under the influence of intoxicating liquors. This gravity is particularly remarkable in Indian children, who at the age of four or five display much more intelligence and maturity than white children. The Mexican loves to throw a mysterious air over the most indifferent actions. The most violent passions are never painted in his features; and there is something frightful in seeing him pass all at once from absolute repose to a state of violent and unrestrained agitation. The Peruvian Indian possesses more gentleness of manners; the energy of the Mexican degenerates into harshness. These differences may have their origin in the different religions and different governments of the two countries in former times. This energy is displayed particularly

* It is difficult to reconcile altogether this account of the Indian taciturnity with that given by Ulloa in his *Noticias Americanas*. He first describes the savage Indians as "largos en los discursos, repitiendo muchas vezes la misma cosa, y durarian el dia entero sin añadir nada à lo que dixeron al principio, si no les procurasse cortar." "En este modo de perorar con presuncion, he continues, fundan tambien su ciencia, y la habilidad con que sobresalen a las otras personas Europeas con quienes tratan, persuadendose à que los inducen à franquearles, lo que desean con su grande eloquencia." This may be thought to apply only to the savage Indians; but he adds, "*Los Indios reducidos* son lo mismo en sus discursos, largos, causados, è importunos hasta el extremo; y si el lenguage no fuese distinto, podria creerse que un Indio del *Peru* hablaba en el Norte ò al contrario." (p. 334). *Trans.*

by the inhabitants of Tlascala. In the midst of their present degradation, the descendants of those republicans are still to be distinguished by a certain haughtiness of character, inspired by the memory of their former grandeur.

The Americans like the Hindoos and other nations who have long groaned under a civil and military despotism, adhere to their customs, manners, and opinions, with extraordinary obstinacy. I say opinions, for the introduction of christianity has produced almost no other effect on the Indians of Mexico than to substitute new ceremonies, the symbols of a gentle and humane religion, to the ceremonies of a sanguinary worship. This change from old to new rites was the effect of constraint and not of persuasion and was produced by political events alone. In the new continent, as well as in the old, half civilized nations were accustomed to receive from the hands of the conqueror new laws and new divinities; and the vanquished Indian gods appeared to them to yield to the gods of the strangers*. In such a complicated mytho-

* The Indians appear to have been not at all contented with their gods, and to have wished only to get well rid of them at the arrival of the Spaniards. Such at least were the sentiments of the principal Indians in New Spain, if we may believe Acosta. When an old Indian chief was asked by a reverend father why they had thrown up their own religion without either proof or investigation or dispute, and adopted that of Christ in its place? "We did not act so inconsiderately," he re-

logy as that of the Mexicans, it was easy to find out an affinity between the divinities of Aztlan and the divinity of the east. Cortez even very artfully took advantage of a popular tradition, according to which the Spaniards were merely the descendants of king Quitzalcoatl, who left Mexico for countries situated in the east, to carry among them civilization and laws. The ritual books composed by the Indians in hieroglyphics at the beginning of the conquest, of which I possess several fragments, evidently show that at that period christianity was confounded with the Mexican mythology: the Holy Ghost is identified with the sacred eagle of the Aztecs. The missionaries not only tolerated, they even favoured to a certain extent, this amalgamation of ideas, by means of which the christian worship was more easily introduced among the natives*. They persuaded

plied, "as you seem to imagine, for we were so wearied and discontented with our gods that we had deliberated about leaving them in good earnest, and adopting others" (porque le hago saber, que estavamos ya tan cansados y descontentos, con las cosas que los y dolos nos mandavan, que aviamos tratado de dexarlos y tomar otra ley). Acosta, p. 357. *Trans.*

* The missionaries do not seem to have concerned themselves much about the motives from which the Indians became christians. Their great object was to get as many baptised as possible, after which all was safe; and they were very much concerned when a parting soul could not be snatched from hell for want of a drop of water in the place at the critical moment. (Ay! no una gota en el rancho, *Gumilla*, II. 21).

them that the gospel had, in very remote times, been already preached in America; and they in-

They were indefatigable in scenting out dying people, *para lograr sus almas.* An old woman (*anciana*) on the point of death, who, from seeing baptism and death follow generally so close upon one another, had very naturally associated them in her mind as inseparable, long resisted all the attempts of a holy father to baptise her. When asked her reason, she said it was for fear of death. "O!" replies the father, "I want to baptize you to secure you a life that will never end." (Para asegurarle una vida que no se accabe.) "If that be the case," cries the old woman, "baptize me immediately." (Yo tambien quiero que me bautices). "I praised God," says Father Gumilla, "on seeing that nobody likes to die, however troublesome life may be, and I admired the stubbornness of that heart which could still flatter itself with such motives; but I immediately baptized her." (*Luego la bauticé*). Gumilla, vol. II. p. 25. Nothing can be more entertaining than the accounts given by the missionaries themselves of the arts and finesse to which they were compelled to have recourse to gain over those unfortunate sons of Adam, *para obrar la eterna dicha de aquellos infelices hijos de Adan.* Father Gumilla, in his instructions to young missionaries, lays them open with more naiveté than prudence, as we might think; but the father very piously considered that the end justified the means. It must be owned that the missionaries displayed great knowledge of human nature. Not a word of religion for a long time. Presents and kind offices, and long endeavours to obtain the Indian's confidence by anticipating his wants, and entering into his views; but above all, the acquisition of the influence which their females naturally possessed over them were the prelude to the grand attack. The females, one of them observes, have every where a great capacity for piety, and must be first attended to. This battery was to be concealed, for if the drift was to be perceived in the

vestigated its traces in the Aztec ritual with the same ardour which the learned, who in our days engage in the study of the Sanscrit, display in discussing the analogy between the Greek mythology and that of the Ganges and the Barampooter.

These circumstances, which will be detailed in another work, explain why the Mexican Indians, notwithstanding the obstinacy with which they adhere to whatever is derived from their fathers, have so easily forgotten their ancient rites. Dogma has not succeeded to dogma, but ceremony to ceremony. The natives know nothing of religion but the exterior forms of worship. Fond of whatever is connected with a prescribed order of

least all was lost. (*Todo esta primera bateria ha de ser occulta de parte del Missionero; porque si se aclara, pierde el viage*). (Gumilla, vol. I. p. 355). After giving a summary of the labours and innumerable shifts of these indefatigable soul-hunters (*Cazadores de Almas*), overpowered with the retrospect the missionary feelingly exclaims, O! quien podra explicar las ganas, que tienen aquellos Cazadores de Almas, de que se compongan bien las cosas, y se legue la hora de poder bautizar aquellos innocentes sin peligro!

One of the greatest difficulties in which the holy fathers were placed, was how to reject the offer of a female companion, which was generally made them, without giving offence al Cacique y a los principales gentiles. When the father modestly blushed (con la mayor modestia bien sonroseado el rostro), and answered that all his love was in heaven, it is impossible to tell the fright and consternation it occasioned (No sabré decir quanta novedad, y espanto causa esta o semejante respuesta.) Gumilla, vol. I. p. 356. *Trans.*

memories, they find in the christian religion particular enjoyments. The festivals of the church, the fire-works with which they are accompanied, the processions mingled with dances and whimsical disguises, are a most fertile source of amusement for the lower Indians. In these festivals the national character is displayed in all its individuality. Every where the christian rites have assumed the shades of the country where they have been transplanted. In the Philippine and Mariana islands the natives of the Malay race have incorporated them with the ceremonies which are peculiar to themselves; and in the province of Pasto, on the ridge of the Cordillera of the Andes, I have seen Indians masked, and adorned with small tinkling bells, perform savage dances around the altar, while a monk of St. Francis elevated the host*.

* From this singular description we may discover more plainly the impolicy with which conversions have been hitherto attempted in foreign parts by our missionary societies. Had they sent away instead of the anabaptists, methodists, and presbyterians which they picked up in Sweden, the north of Germany, both parts of this island, and the Lord knows where, an equal number of our more volatile catholic brethren in Ireland, the conversion might already, perhaps, have made a great progress. The people of Otaheite very feelingly exclaimed, "These missionaries give us still plenty of the word of God, but they give us no more hatchets;" but they would have been probably just as well contented with singing, and dancing, and fireworks. This is a much more economical method of keeping these people assembled together than the distribution of

Accustomed to a long slavery, as well under the domination of their own sovereigns as under that of the first conquerors, the natives of Mexico patiently suffer the vexations to which they are frequently exposed from the whites. They oppose to them only a cunning, veiled under the most deceitful appearances of apathy and stupidity. As the Indian can very rarely revenge himself on the Spaniards, he delights in making a common cause with them for the oppression of his own fellow citizens. Harassed for ages, and compelled to a blind obedience, he wishes to tyrannize in his turn. The Indian villages are governed by magistrates of the copper-coloured race; and an Indian alcalde exercises his power with so much the

hatchets. The catholics went better to work. They, too, knew the power of this sort of hatchet bribery. "Se debe llevar avalorios, cuentas de vidrio, cuchillos, anzuelos, y otras buxerias, que para los Gentiles son de mucho aprecio." (Gumilla, I. 349); but they knew that this source must soon dry up; and the holy fathers set all their natural gallantry to work to gain over the women, who seem to be equally susceptible in that quarter, whether savage or civilized, as the men they were aware would soon follow them. They said kind things to the women, praised the beauty of their children, took them up in their arms and caressed them. The women are very fond of that, says a father, Quando va a ver a los Indios en sus casas, tome en sus brazos alguno de aquellos parvulos, le accaricie y haga fiestas a su modo: esto apprecian grandemente *las Indias*. How are we to be astonished then at the very different results of the endeavours of these two classes of missionaries! *Trans.*

greater severity, because he is sure of being supported by the priest or the *Spanish subdelegado*. Oppression produces every where the same effects, it every where corrupts the morals *.

As the Indians almost all of them belong to the class of peasantry and low people, it is not so easy to judge of their aptitude for the arts which embellish life. I know no race of men who appear more destitute of imagination. When an Indian attains a certain degree of civilization, he displays a great facility of apprehension, a judicious mind, a natural logic, and a particular disposition to subtilize or seize the finest differences in the comparison of objects. He reasons coolly and orderly, but he never manifests that versatility of imagination, that glow of sentiment, and that creative and animating art which characterize the nations of the south of Europe, and several tribes of African negros †. I deliver this opinion, how-

* The present state of the world unfortunately affords too good an illustration of this maxim. The West Indian slave when he becomes a master is the most cruel of all masters; and the life of a negro's cat, or dog, is synonimous there with a life not worth having. The Greeks, who are much employed in collecting the revenue in Turkey, are infinitely more persecuting than the Turks. And the Hindoo has his most grievous calamities to apprehend from his own brethren armed with foreign authority. Every where cunning and cruelty spring from tyranny and oppression. *Trans.*

† What must our brethren of the northern part of this island, who have attained no small reputation for a pragmatical

ever, with great reserve. We ought to be infinitely circumspect in pronouncing on the moral or intellectual dispositions of nations from which we are separated by the multiplied obstacles which result from a difference in language and a difference of manners and customs. A philosophical observer finds what has been printed in the centre of Europe on the national character of the French, Italians, and Germans, inaccurate. How, then, should a traveller, after merely landing in an island, or remaining only a short time in a distant country, arrogate to himself the right of deciding on the different faculties of the soul, on the preponderance of reason, wit, or imagination among nations?

The music and dancing of the natives partake of this want of gaiety which characterises them. *M.* Bonpland and myself observed the same thing in all South America. Their songs are terrific and melancholic. The Indian women show more vivacity than the men; but they share the usual misfortunes of the servitude to which the sex is condemned among nations where civilization is in its infancy.

and metaphysical disposition, and who are so much disposed to give metaphysical superiority a precedence over all the other human faculties, feel, when they find that, most probably, their future rivals are not to spring up in any of the rival colleges of the south, or even in any of the great German universities, but among the beardless tribes of the Mexican mountains, and the banks of the Orinoco! *Trans.*

The women take no share in the dancing; but they remain present to offer fermented draughts to the dancers, prepared by their own hands.

The Mexicans have preserved a particular relish for painting, and for the art of carving in wood, or stone. We are astonished at what they are able to execute with a bad knife on the hardest wood. They are particularly fond of painting images and carving statues of saints. They have been servilely imitating, for these three hundred years, the models which the Europeans imported with them at the conquest. This imitation is derived from a religious principle of a very remote origin. In Mexico, as in Hindostan, it was not allowable in the faithful to change the figure of their idols in the smallest degree. Whatever made a part of the Aztec or Hindoo ritual was subjected to immutable laws. For this reason we shall form a very imperfect judgment of the state of the arts and the natural taste of these nations, if we merely consider the monstrous figures under which they represent their divinities. The christian images have preserved in Mexico a part of that stiffness and that harshness of feature which characterize the hieroglyphical pictures of the age of Montezuma. Many Indian children educated in the college of the capital, or instructed at the academy of painting founded by the king, have no doubt distinguished themselves; but it is much less by their genius than their application. Without ever leav-

ing the beaten track, they display great aptitude in the exercise of the arts of imitation; and they display a much greater still for the purely mechanical arts. This aptitude cannot fail of becoming some day very valuable, when the manufactures shall take their flight to a country where a regenerating government remains yet to be created.

The Mexican Indians have preserved the same taste for flowers which Cortez found in his time. A nosegay was the most valuable treat which could be made to the ambassadors who visited the court of Montezuma. This monarch and his predecessors had collected a great number of rare plants in the gardens of Istapalapan. The famous *hand-tree*, the cheirostemon*, described by M. Cervantes, of which for a long time only a single individual was known of very high antiquity, appears to indicate that the kings of Toluca cultivated also trees strangers to that part of Mexico. Cortez, in his letters to the emperor Charles the Fifth, frequently boasts of the industry which the Mexicans displayed in gardening; and he complains that they did not send him the seeds of or-

* M. Bonpland has given a drawing of it in our *Plantes Equinoxiales*, vol. i. p. 75. pl. 24. For some little time past, roots of the *Arbol de las manitas* have been in the gardens of Montpellier and Paris. The cheirostemon is as remarkable for the form of its corolla as the Mexican gyrocarpus which we have introduced into the European gardens, and of which the celebrated Jacquin could not discover the flower, is for the form of its fruits.

namental flowers and useful plants which he demanded for his friends of Seville and Madrid. The taste for flowers undoubtedly indicates a relish for the beautiful; and we are astonished at finding it in a nation in which a sanguinary worship and the frequency of sacrifices appeared to have extinguished whatever related to the sensibility of the soul, and kindness of affection. In the great market-place of Mexico the native sells no peaches, nor ananas, nor roots, nor pulque (the fermented juice of the agave), without having his shop ornamented with flowers, which are every day renewed. The Indian merchant appears seated in an intrenchment of verdure. A hedge of a metre * in height, formed of fresh herbs, particularly of gramina with delicate leaves, surrounds like a semicircular wall the fruits offered to public sale. The bottom, of a smooth green, is divided by garlands of flowers which run parallel to one another. Small nosegays placed symmetrically between the festoons give this inclosure the appearance of a carpet strewn with flowers. The European who delights in studying the customs of the lower people, cannot help being struck with the care and elegance the natives display in distributing the fruits which they sell in small cages of very light wood. The sapotilles (achras), the mammea, pears, and raisins, occupy the bottom, while the

* $3\frac{1}{4}$ feet.

top is ornamented with odoriferous flowers. This art of entwining fruits and flowers had its origin, perhaps, in that happy period when, long before the introduction of inhuman rites, the first inhabitants of Anahuac, like the Peruvians, offered up to the great spirit Teo l the first fruits of their harvest.

These scattered features, characteristic of the natives of Mexico, belong to the Indian peasant, whose civilization, as we have already stated, is somewhat akin to that of the Chinese and Japanese. I am able only to pourtray still more imperfectly the manners of the pastoral Indians, whom the Spaniards include under the denomination of *Indios Bravos*, and of whom I have merely seen a few individuals, brought to the capital as prisoners of war. The Mecos (a tribe of the Chichimecs), the Apaches, the Lipans, are hordes of hunters, who, in their incursions, for the most part nocturnal, infest the frontiers of New Biscay, Sonora, and New Mexico. These savages, as well as those of South America, display more nobility of mind and more force of character than the agricultural Indians. Some tribes of them possess even languages of which the mechanism proves an ancient civilization. They experience great difficulty in learning our European idioms, while they express themselves in their own with great facility. These very Indian chiefs, whose solemn taciturnity astonishes the observer, hold discourses for hours when any great interest

excites them to break their natural silence. We observed the same volubility of tongue in the missions of Spanish Guiana, and among the Caribs of the lower Orinoco, of which the language is singularly rich and sonorous *.

* Gilij, an Italian missionary, who resided eighteen years among the nations of the Orinoco, and became master of their languages, published three octavo volumes at Rome, in 1780-1-2, which he entitled *Saggio di Storia Americana.* In these volumes there is much information with regard to the Indians, particularly those of the Orinoco. From the samples which he gives of their languages, some of them would seem to be remarkably expressive, as well as sonorous, and form in the latter respect a singular contrast to those of Mexico. All the words of the Orinochese languages, he says, constantly end in vowels, and none of these languages are difficult to pronounce. But though they end in vowels, they have nothing of the inarticulate appearance of the vowel languages of the South Seas. What wilt thou eat to-morrow? is thus expressed in the Maipurese language: *Nunaunari iti pare peccari upie?* The following will serve to show the expressiveness of the Maipurese language: one who has no father, one who has no mother, one who has no wife, one who has no children: *Macchivaeneteni, matuteni, maanituteni, maaniteni.*

Here are a few vocables from the Tamanac and Maipurese languages, with the corresponding ones in English.

English.	Tamanac.	Maip.
Earth	Noni	Peni
Heaven	Capu	Eno
Water	Tuno	Veni
Father	Papa	Nape
Sun	Veju	Chie
Fire	Vaplo	Catti
Bread	Ute	Ussi.

After examining the physical constitution and intellectual faculties of the Indians, it remains for us to give a rapid survey of their social state. The history of the lower classes of a people is the relation of the events which, in creating at the same time a great inequality of fortune, enjoyment, and individual happiness, have gradually placed a part of the nation under the tutory and control of the other. We shall seek in vain this relation in the annals of history. They transmit to us the memory of the great political revolutions, wars, con-

Gilij describes the nations of the Orinoco as libidinous, which sounds rather singularly applied to Indians; and he gives a very amusing account of their powers of mimicry, and the manner in which they counterfeit the language and gestures of the missionaries, for the purpose of turning them into ridicule. One would think, almost, that the French nation had sitten for the following portrait of the Maipurese. "Generalmente adunque parlando, son gli Orinochesi di genio allegro; ma sopra ogni altra nazione spiccano i Maipuri per l'affabilità e l'amorevolezza con cui trattono i forestieri. Quindi è l'amore che portan loro gli Europei tutti, che li conoscano. Non v' ha forse Indiani, che più si affaciano all umore di ognuno. Fanno delle amicizie con tutti, ed appena trovasi in Orinoco una nazione in cui non siavi qualche Maipure. La loro lingua siccome facilissima ad imparare, è divenuta tra gli Orinochesi una lingua di moda; e chi poco, chi molto, chi mediocremente, chi bene, la parlano quasi tutti. I Maipuri nondimeno (il che toglie loro un gran pregio) sono incostanti, poco schietti; e non tanto internamente buoni, quanto per l'innata loro civiltà compajono agli altri. Vol ii. p. 43.

Father Gumilla speaks highly of the state of music among the tribes of the Orinoco. *Trans.*

quests, and the other scourges which have afflicted humanity; but they inform us nothing of the more or less deplorable lot of the poorest and most numerous class of society. The cultivator enjoys freely, only in a very small part of Europe, the fruits of his labour; and we are forced to own that this civil liberty is not so much the result of an advanced civilization, as the effect of those violent crises during which one class or one state has taken advantage of the dissensions of the other. The true perfection of social institutions depends no doubt on information and intellectual cultivation; but the concatenation of the springs which move a state is such, that in one part of the nation this cultivation may make a very remarkable progress without the situation of the lower orders becoming more improved. Almost the whole north of Europe confirms this sad experience. There are countries there, where, notwithstanding the boasted civilization of the higher classes of society, the peasant still lives in the same degradation under which he groaned three or four centuries ago. We should think higher, perhaps, of the situation of the Indians were we to compare it with that of the peasants of Courland, Russia, and a great part of the north of Germany.

The Indians whom we see scattered throughout the cities, and spread especially over the plains of Mexico, whose number (without including those of mixed blood) amounts to two millions and a

half, are either descendants of the old peasantry, or the remains of a few great Indian families, who, disdaining alliance with the Spanish conquerors, preferred rather to cultivate with their hands the fields which were formerly cultivated for them by their vassals. This diversity has a sensible influence on the political state of the natives, and divides them into tributary and noble or cacique Indians. The latter, by the Spanish laws, ought to participate in the privileges of the Castilian nobility. But in their present situation this is merely an illusory advantage. It is now difficult to distinguish, from their exterior, the caciques from those Indians whose ancestors in the time of Montezuma II. constituted the lower cast of the Mexican nation. The noble, from the simplicity of his dress and mode of living; and from the aspect of misery which he loves to exhibit, is easily confounded with the tributary Indian. The latter shows to the former a respect which indicates the distance prescribed by the ancient constitutions of the Aztec hierarchy. The families who enjoy the hereditary rights of *Cacicasgo*, far from protecting the tributary cast of the natives, more frequently abuse their power and their influence. Exercising the magistracy in the Indian villages, they levy the capitation tax: they not only delight in becoming the instruments of the oppressions of the whites; but they also make use of their power and authority to extort small sums for their own ad-

vantage. Well informed intendants, who have bestowed much attention for a long time to the detail of this Indian administration, assured me that the oppressions of the caciques bore very heavy on the tributary Indians. In the same manner, in many parts of Europe where the Jews are still deprived of the rights of naturalization, the rabbins oppress the members of the community confided to them. Moreover, the Aztec nobility display the same vulgarity of manners, and the same want of civilization with the lower Indians. They remain, as it were, in the same state of insulation; and examples of native Mexicans, enjoying the *Cacicasgo*, following the sword or the law are infinitely rare. We find more Indians in ecclesiastical functions, particularly in that of parish priest: the solitude of the convent appears only to have attractions for the young Indian girls.

When the Spaniards made the conquest of Mexico, they found the people in that state of abject submission and poverty which every where accompanies despotism and feudality. The emperor, princes, nobility, and clergy (the teopixqui), alone possessed the most fertile lands; the governors of provinces indulged with impunity in the most severe exactions; and the cultivator was every where degraded. The highways, as we have already observed, swarmed with mendicants; and the want of large quadrupeds forced thousands of Indians to perform the functions of beasts of burden, and

to transport the maize, cotton, hides, and other commodities, which the more remote provinces sent by way of tribute to the capital. The conquest rendered the state of the lower people still more deplorable. The cultivator was torn from the soil and dragged to the mountains, where the working of the mines commenced; and a great number of Indians were obliged to follow the armies, and to carry, without sufficient nourishment or repose, through mountainous woods, burdens which exceeded their strength. All Indian property, whether in land or goods, was conceived to belong to the conqueror. This atrocious principle was even sanctioned by a law, which assigns to the Indians a small portion of ground around the newly constructed churches.

The court of Spain seeing that the new continent was depopulating very rapidly, took measures, beneficial in appearance, but which the avarice and cunning of the conquerors *(conquistadores)* contrived to direct against the very people whom they were intended to relieve. The system of *encomiendas* was introduced. The Indians, whose liberty had in vain been proclaimed by Queen Isabella, were till then slaves of the whites, who appropriated them to themselves indiscriminately. By the establishment of the *encomiendas*, slavery assumed a more regular form. To terminate the quarrels among the *conquistadores*, the remains of the conquered people were shared out; and the Indians, divided into

tribes of several hundreds of families, had masters named to them in Spain from among the soldiers who had acquired distinction during the conquest, and from among the people of the law*, sent out by the court as a counterpoise to the usurping power of the generals. A great number of the finest *encomiendas* were distributed among the monks; and religion, which, from its principles, ought to favour liberty, was itself degraded in profiting by the servitude of the people†. This partition of the Indians attached them to the soil; and their work became the property of the *encomenderos*. The slave frequently took the family name of his master. Hence many Indian families bear Spanish names, without their blood having been in the least degree mingled with the European. The court of Madrid imagined that it had bestowed protectors on the Indians: it only made the evil worse, and gave a more systematical form to oppression.

* These powerful men frequently bore only the simple title of *licenciados*, from the degree which they had taken in their faculties.

† And yet the priests could not conceive why the people run off like *children from school*, as one of them emphatically has it! Su *ruda ignorancia* les hace proceder (aunque viejos) con las modales proprios de ninos, y con tan leve motivo, como un nino se huye de la Escuela, se huye un cacique con todos sus vasallos de un Pueblo, y queda solo el missionero: tal es su *inconstancia!!* Gumilla, vol. i. p. 117. *Trans.*

Such was the state of the Mexican cultivators in the sixteenth and seventeenth centuries. In the eighteenth their situation assumed progressively a better appearance. The families of the *conquistadores* are partly extinguished; and the *encomiendas*, considered as fiefs, were not redistributed. The viceroys, and especially the *audiencias*, watched over the interests of the Indians; and their liberty, and, in some provinces, their ease of circumstances even, have been gradually augmenting. It was King Charles the Third especially who, by measures equally wise and energetic, became the benefactor of the Indians. He annulled the *encomiendas*; and he prohibited the *repartimientos*, by which the *corregidors* arbitrarily constituted themselves the creditors, and consequently the masters, of the industry of the natives, by furnishing them, at extravagant prices, with horses, mules, and clothes (*ropa*). The establishment of intendancies, during the ministry of the Count de Galvez, was a memorable epoqua for Indian prosperity. The minute vexations to which the cultivator was incessantly exposed from the subaltern Spanish and Indian magistracy, have singularly diminished under the active superintendance of the intendants; and the Indians begin to enjoy advantages which laws, gentle and humane in general, afforded them, but of which they were deprived in ages of barbarity and oppression. The first choice of the

persons to whom the count confided the important places of intendant or governor of a province was extremely fortunate. Among the twelve who shared the administration of the country in 1804, there was not one whom the public accused of corruption or want of integrity.

Mexico is the country of inequality. No where does there exist such a fearful difference in the distribution of fortune, civilization, cultivation of the soil, and population. The interior of the country contains four cities, which are not more than one or two days journey distant from one another, and possess a population of 35,000, 67,000, 70,000, and 135,000. The central table-land from la Puebla to Mexico, and from thence to Salamanca and Zelaya, is covered with villages and hamlets like the most cultivated parts of Lombardy. To the east and west of this narrow stripe succeed tracts of uncultivated ground, on which cannot be found ten or twelve persons to the square league. The capital and several other cities have scientific establishments, which will bear a comparison with those of Europe. The architecture of the public and private edifices, the elegance of the furniture, the equipages, the luxury and dress of the women, the tone of society, all announce a refinement to which the nakedness, ignorance, and vulgarity of the lower people form the most striking contrast. This immense inequality of fortune does not only exist among the cast

of whites (Europeans or Creoles), it is even discoverable among the Indians.

The Mexican Indians, when we consider them *en masse*, offer a picture of extreme misery. Banished into the most barren districts, and indolent from nature, and more still from their political situation, the natives live only from hand to mouth. We should seek almost in vain among them for individuals who enjoy any thing like a certain mediocrity of fortune. Instead, however, of a comfortable independency, we find a few families whose fortune appears so much the more colossal, as we least expect it among the lowest class of the people. In the intendancies of Oaxaca and Valladolid, in the valley of Toluca, and especially in the environs of the great city of la Puebla de los Angeles, we find several Indians, who under an appearance of poverty conceal considerable wealth. When I visited the small city of Cholula, an old Indian woman was buried there, who left to her children plantations of *maguey* (agave) worth more than 360,000 francs*. These plantations are the vineyards and sole wealth of the country. However there are no caciques at Cholula; and the Indians there are all tributary, and distinguished for their great sobriety and their gentle and peaceable manners. The manners of the Cholulans exhibit a singular contrast to those of their

* 15,000l. sterling. *Trans.*

neighbours of Tlascala, of whom a great number pretend to be the descendants of the highest titled nobility, and who increase their poverty by a litigious disposition and a restless and turbulent turn of mind. Among the most wealthy Indian families at Cholula are the Axcotlan, the Sarmientos and Romeros; at Guaxocingo, the Sochipiltecatl; and especially the Tecuanouegues in the village de los Reyes. Each of these families possesses a capital of from 800,000 to 1,000,000 of livres *. They enjoy, as we have already stated, great consideration among the tributary Indians; but they generally go barefooted, and covered with a Mexican tunic of coarse texture and a brown colour, approaching to black, in the same way as the very lowest of the Indians are usually dressed.

The Indians are exempted from every sort of indirect impost. They pay no *alcavala*; and the law allows them full liberty for the sale of their productions. The supreme council of finances of Mexico, called the *Junta superior de Real Hacienda*, endeavoured from time to time, especially within these last five or six years, to subject the Indians to the alcavala. We must hope that the court of Madrid, which in all times has endeavoured to protect this unfortunate race, will preserve to them their immunity so long as they shall continue subject to the direct impost of the

* From 33,330l. to 41,670l. sterling. *Trans.*

tributos. This impost is a real capitation tax, paid by the male Indians between the ages of ten and fifty. The tribute is not the same in all the provinces of New Spain; and it has been diminished within the last two hundred years. In 1601, the Indian paid yearly 32 reals of plata of *tributo*, and four reals of *servicio real*, in all nearly 23 francs*. It was gradually reduced in some intendancies to 15 and even to five† francs‡. In the bishopric of Mechoacan, and in the greatest part of Mexico, the capitation amounts at present to 11 francs§. Besides, the Indians pay a parochial duty (*derechos parroquiales*) of 10 francs for baptism, 20 francs for a certificate of marriage, and 20 francs for interment. We must also add to these 62 francs, which the church levies as an impost on every individual, from 25 to 30 francs for offerings which are called voluntary, and which go under the names of *cargos de cofradias*, *responsos* and *misas para sacar animas*||.

* 19s. 2d. *Trans.* † 12s. 6d. and 4s. 2d. *Trans.*

‡ Compendio de la historia de la *Real Hacienda de Nueva España*, a manuscript work presented by Don Joacquin Maniau, in 1793, to the secretary of state Don Diego de Gardoqui, of which there is a copy in the archives of the viceroyalty.

§ 9s. 2d. *Trans.*

|| The Spanish clergy seem to have been perfectly disposed to make the Indians pay pretty well beforehand in earthly treasure for the heavenly felicity (*eterna dicha*) they communicated to them. But what were these trifles when

If the legislation of Queen Isabella and the Emperor Charles V. appears to favour the Indians with regard to imposts, it has deprived them, on the other hand, of the most important rights enjoyed by the other citizens. In an age when it was formally discussed if the Indians were rational beings, it was conceived granting them a benefit to treat them like minors, to put them under the perpetual tutory of the whites, and to declare null every act signed by a native of the copper-coloured race, and every obligation which he contracted beyond the value of 15 francs. These laws are maintained in full vigour; and they place insurmountable barriers between the Indians and the other casts, with whom all intercourse is almost prohibited. Thousands of inhabitants can enter into no contract which is binding *(no pueden tratar y contratar)*; and condemned to a perpetual minority, they become a charge to themselves and the state in which they live. I cannot better

weighed in the balance with the immensity of the benefits imported by the catholic arms into these provinces? "El feliz tiempo," exclaims the reverend Father Gumila, "para tantos millones de Indios, como yá, por la Bondad de Dios, se han salvado, y salvan (aunque infeliz para los que aun estan en su ciega ignorancia, o ciegamente resisten a la luz evangelica) empezò desde que las armas catholicas tomaron possession de las principales provincias de aquellos dos vastos imperios, y prosiegue hasta abòra, creciendo siempre en todos angulos del Nuevo mundo la luz de la Santa Fe, para *eterna dicha* de aquellos infelices hijos d'Adan (vol i. p. 74.) *Trans.*

finish the political view of the Indians of New Spain than by laying before the reader an extract from a memoir presented by the bishop and chapter of Mechoacan* to the king, in 1799, which breathes the wisest views and the most liberal ideas.

This respectable bishop†, whom I had the advantage of knowing personally, and who terminated his useful and laborious life at the advanced age of 80, represents to the monarch, that in the actual state of things the moral improvement of the Indian is impossible, if the obstacles are not removed which oppose the progress of national industry. He confirms the principles which he

* *Informe del Obispo y Cabildo eclesiastico de Valladolid de Mechoacan al Rey sobre Jurisdiccion y Ymunidades del Clero Americano.* This report, which I possess in manuscript, containing more than 10 sheets, was drawn up on the occasion of the famous *Cedula real* of the 25th October 1795, which permitted the secular judge to try the *delittos enormes* of the clergy. The *Sala del crimen*, persuaded of their right, treated the priests with severity, and cast them into the same prisons with the lowest classes of the people. In this struggle, the *audiencia* ranged themselves on the side of the clergy. Disputes of jurisdiction are very common in distant countries. They are pursued with so much the greater keenness, as the European policy from the first discovery of the new world has always considered the disunion of casts, of families, and constituted authorities, the surest means of preserving the colonies in a dependence on the mother country.

† *Fray Antonio de San Miguel*, monk of St. Jerome de Corvan, native of the *Montañas de Santander*.

lays down by several passages from the works of Montesquieu and Bernardin de St. Pierre. These citations can hardly fail to surprise us from the pen of a prelate belonging to the regular clergy, who passed a part of his life in convents, and who filled an episcopal chair on the shores of the South Sea. "The population of New Spain," says the bishop towards the end of his memoir, "is composed of three classes of men, whites or Spaniards, Indians, and castes. I suppose the Spaniards to compose the tenth part of the whole mass. In their hands almost all the property and all the wealth of the kingdom are centered. The Indians and the castes cultivate the soil; they are in the service of the better sort of people; and they live by the work of their hands. Hence there results between the Indians and the whites that opposition of interests, and that mutual hatred, which universally takes place between those who possess all and those who possess nothing, between masters and those who live in servitude. Thus we see, on the one hand, the effects of envy and discord, deception, theft, and the inclination to prejudice the interests of the rich; and on the other, arrogance, severity, and the desire of taking every moment advantage of the helplessness of the Indian. I am not ignorant that these evils every where spring from a great inequality of condition. But in America they are rendered still more terrific, because there exists no

intermediate state: we are rich or miserable, noble or degraded by the laws or the force of opinion *(infame de derecho y hecho.)*

" In fact, the Indians and the races of mixed blood *(castas)* are in a state of extreme humiliation. The colour peculiar to the Indians, their ignorance, and especially their poverty, remove them to an infinite distance from the whites, who occupy the first rank in the population of New Spain. The privileges which the laws seem to concede to the Indians are of small advantage to them, perhaps they are rather hurtful. Shut up in a narrow space of 600 varas (500 metres *) of radius, assigned by an ancient law to the Indian villages, the natives may be said to have no individual property, and are bound to cultivate the common property *(bienes de communidad)*. This cultivation is a load so much the more insupportable to them, as they have now for several years back lost all hope of ever being able to enjoy the fruit of their labour. The new arrangement of intendancies bears, that the natives can receive no assistance from the funds of the communalty without a special permission of the Board of Finances of Mexico (*junta superior de la Real Hacienda*"). (The communal property has been farmed out by the intendants; and the produce of the labour of the natives is poured into the royal treasury, where

* 1640 feet. *Trans.*

the *officiales reales* keep an account, under special heads, of what they call the property of each village. I say what they call the property, for this property is nothing more than a fiction for these last twenty years. The intendant even cannot dispose of it in favour of the natives, who are wearied of demanding assistance from the communalty funds. The *junta de Real Hacienda* demands *informes* from the *fiscal* and the *asesor* of the viceroy. Whole years pass in accumulating documents, but the Indians remain without any answer. The money of the *caxas de communidades* is so habitually considered as having no fixed destination, that the intendant of Valladolid sent in 1798 more than a million of francs* to Madrid, which had been accumulating for twelve years. The king was told that it was a gratuitous and patriotic gift from the Indians of Mechoacan to the sovereign, to aid in the prosecution of the war against England!)

"The law prohibits the mixture of casts; it prohibits the whites from taking up their residence in Indian villages; and it prevents the natives from establishing themselves among the Spaniards. This state of insulation opposes obstacles to civilization. The Indians are governed by themselves; all their subaltern magistrates are of the copper-coloured race. In every village we find eight or

* 41,670l. sterling. *Trans.*

ten old Indians who live at the expence of the rest, in the most complete idleness, whose authority is founded either on a pretended elevation of birth, or on a cunning policy transmitted from father to son. These chiefs, generally the only inhabitants of the village who speak Spanish, have the greatest interest in maintaining their fellow citizens in the most profound ignorance; and they contribute the most to perpetuate prejudices, ignorance, and the ancient barbarity of manners.

"Incapable, from the Indian laws, of entering into any contract, or running in debt to the extent of more than five piastres, the natives can only attain to an amelioration of their lot, and enjoy some sort of comfort as common labourers, or as artisans. Solorzano, Fraso, and other Spanish authors, have in vain endeavoured to investigate the secret cause why the privileges conceded to the Indians have constantly produced the most unfavourable effects to them. I am astonished that these celebrated jurisconsults never conceived that what they call a secret cause springs from the very nature of these privileges. They are arms which have never served for the protection of those which they were destined to defend, and which the citizens of the other casts could not fail to employ against the Indian race. Such a union of deplorable circumstances has produced in them an indolence of mind, and that state of

indifference and apathy in which man is neither affected by hope nor fear.

"The *casts*, descendants of negro slaves, are branded with infamy by the law; and are subjected to *tribute*. This direct impost imprints on them an indelible stain: they consider it as a mark of slavery transmissible to the latest generations. Among the mixed race, among the mestizoes and mulattoes, there are many families, who from their colour, their physiognomy, and their cultivation, might be confounded with the Spaniards; but the law keeps them in a state of degradation and contempt. Endowed with an energetic and ardent character, these men of colour live in a constant state of irritation against the whites; and we must be astonished that their resentment does not more frequently dispose them to acts of vengeance.

"The Indians and the *casts* are in the hands of the magistrates of districts (*justicias territoriales*), whose immorality has not a little contributed to their misery. So long as the *alcaldias mayores* subsisted in Mexico, the alcaldes considered themselves as merchants who had acquired an exclusive privilege of buying and selling in their provinces, and who could draw from this privilege, in some sort or other, from 30,000 to 200,000 piastres, from 150,000 to 1,000,000 francs*, and, what is

* From 6250l. to 41,670l. sterling. *Trans.*

more, in the short space of five years. These usurious magistrates compelled the Indians to purchase, at arbitrary prices, a certain number of cattle. By this means the natives became their debtors. Under the pretext of recovering the capital and usury, the *alcalde mayor* disposed of the Indians, the whole year round, as true slaves. The individual happiness of these unfortunate wretches was not certainly increased by the sacrifice of their liberty, for a horse or a mule to work for their master's profit. But yet in the midst of this state of things, brought on by abuses, agriculture and industry were seen to increase.

"On the establishment of intendancies, the government wished to put an end to the oppressions which arose from the *repartimientos*. In place of *alcaldes mayores*, they named *subdelegados*, subaltern magistrates, to whom every sort of traffic was prohibited. As no salaries were assigned to them, or any sort of fixed emolument, the evil has become worse. The *alcaldes mayores* administered justice with impartiality, whenever their own interests were not concerned. The subdelegates of the intendants having no other revenues but casualties, believed themselves authorised to employ illicit means to procure themselves a comfortable subsistence. Hence, the perpetual oppressions and the abuses of authority to which the poor were subject; and hence the indulgence towards the rich, and the shameful traffic

of justice. The intendants find the greatest difficulties in the choice of the *subdelegados*, from whom, in the actual state of things, the Indians can neither expect support or protection. That support and that protection they seek from the clergy; and hence the constant opposition in which the clergy and subdelegates usually live. However the natives place more confidence in the clergy and magistrates of a superior rank, the intendants and the *oidores* members of the *audiencia*). Now, Sire, what attachment can the Indian have to the government, despised and degraded as he is, and almost without property and without hope of ameliorating his existence? He is merely attached to social life by a tie which affords him no advantage. Let not your majesty believe, that the dread of punishment alone is sufficient to preserve tranquillity in this country: there must be other motives, there must be more powerful motives. If the new legislation which Spain expects with impatience do not occupy itself with the situation of the Indians and people of colour, the influence which the clergy possess over the hearts of these unfortunate people, however great it may be, will not be sufficient to contain them in the submission and respect due to their sovereign.

"Let the odious personal impost of the *tributo* be abolished; and let the infamy (*infamia de derecho*) which unjust laws have attempted to

stamp on the people of colour be at an end; let them be declared capable of filling every civil employment which does not require a special title of nobility; let a portion of the demesnes of the crown *(tierras realenguas)*, which are generally uncultivated, be granted to the Indians and the *castes;* let an agrarian law be passed for Mexico similar to that of the Asturias and Galicia, by which the poor cultivator is permitted to bring in under certain conditions the land which the great proprietors have left so many ages uncultivated to the detriment of the national industry; let full liberty be granted to the Indians, the *castes*, and the whites to settle in villages which at present belong only to one of these classes; let salaries be appointed for all judges and all magistrates of districts; these, Sire, are the six principal points on which the felicity of the Mexican people depends.

"It appears strange, no doubt, that, in a juncture when the finances of the state are in a deplorable situation, we presume to propose to your majesty the abolition of the tribute. A very simple calculation will prove, however, that the adoption of the measures above indicated, and the conceding to the Indian all the rights of denizens, will increase considerably instead of diminishing the revenues of the state (Real Hacienda)." The bishop supposes 810,000 families of Indians and men of colour in the whole extent of New Spain. Several of these families, especially those of mixed

blood, are clothed and enjoy some degree of comfort. They live nearly in the manner of the lower people of the peninsula; and their number is a third of the whole mass. The annual consumption of this third part may be estimated at 300 piastres per family*. Reckoning for the other thirds only 60† piastres‡, and supposing the Indians to pay the *alcavala* of 14 per cent. like the whites, an annual revenue would be raised of 5,000,000 of piastres §, a much greater revenue than the quadruple of the present value of the *tributes*. We will not guarantee the accuracy of the numbers on which this calculation is founded; but a simple sketch may suffice to prove, that on establishing an equality of duties and imposts among the different classes of people, not only the abolition of the capitation would create no deficit in the crown revenues, but that these revenues would necessarily increase with the increase of comfort and prosperity among the natives.

We might have hoped that the administrations of three enlightened viceroys, animated with the most noble zeal for the public good, the Marquis de Croix, the Count de Revillagigedo, and the

* 67*l.* 12*s.* 6*d.* sterling. *Trans.* † 13*l.* 2*s.* 6*d.* sterling. *Trans.*

‡ It is computed that in the warm region of Mexico, a day labourer requires annually for himself and family, in nourishment and clothes, 72 piastres. The luxury is nearly 20 piastres less in the cold region of the country.

§ 1,093,750*l.* sterling.

Chevalier d'Asanza, would have produced some happy changes in the political state of the Indians; but these hopes have been frustrated. The power of the viceroys has been singularly diminished of late: they are fettered in all their measures, not only by the *junta* of finances *(de Real Hacienda)*, and by the high court of justice *(Audiencia)*, but also by the government in the mother country, which possesses the mania of wishing to govern in the greatest detail provinces at the distance of two thousand leagues, the physical and moral state of which are equally unknown to them. The philanthropists affirm, that it is happy for the Indians that they are neglected in Europe, because sad experience has proved that the most part of the measures adopted for their relief have produced an opposite effect. The lawyers, who detest innovations, and the Creol proprietors, who frequently find their interest in keeping the cultivator in degradation and misery, maintain that we must not interfere with the natives, because, on granting them more liberty, the whites would have every thing to fear from the vindictive spirit and arrogance of the Indian race. The language is always the same whenever it is proposed to allow the peasant to participate in the rights of a free man and a citizen. I have heard the same arguments repeated in Mexico, Peru, and the kingdom of New Grenada, which, in several parts of Germany, Poland, Livonia, and

Russia, are opposed to the abolition of slavery among the peasants.

Recent examples ought to teach us how dangerous it is to allow the Indians to form a *status* in *statu*, to perpetuate their insulation, barbarity of manners, misery, and consequently motives of hatred against the other casts. These very stupid indolent Indians, who suffer themselves patiently to be lashed at the church-doors, appear cunning, active, impetuous, and cruel, whenever they act in a body in popular disturbances. It may be useful to relate a proof of this assertion. The great revolt in 1781 very nearly deprived the king of Spain of all the mountainous part of Peru, at the period when Great Britain lost nearly all her colonies in the continent of America. Jose Gabriel Condorcanqui, known by the name of the Inca Tupac-Amaru, appeared at the head of an Indian army before the walls of Cusco. He was the son of the cacique of Tongasuca, a village of the province of Tinta, or rather the son of the cacique's wife; for it is certain that the pretended Inca was a Mestizoe, and that his true father was a monk. The Condorcanqui family traces its origin up to the Inca Sayri-Tupac, who disappeared in the thick forests to the east of Villcapampa, and to the Inca Tupac-Amaru, who, contrary to the orders of Philip the Second, was decapitated in 1578 under the viceroy Don Francisco de Toledo.

Jose Gabriel was carefully educated at Lima; and he returned to the mountains, after having in vain solicited from the court of Spain the title of Marquis d'Oropesa, which belongs to the family of the Inca Sayri-Tupac. His spirit of vengeance drove him to excite the highland Indians, irritated against the corregidor Arriaga, to insurrection. The people acknowledged him as a descendant of their true sovereigns, and as one of the children of the sun. The young man took advantage of the popular enthusiasm which he had excited by the symbols of the ancient grandeur of the empire of Cusco; he frequently bound round his forehead the imperial fillet of the Incas; and he artfully mingled christian ideas with the memorials of the worship of the sun.

In the commencement of his campaigns he protected ecclesiastics and Americans of all colours. As he only broke out against Europeans, he made a party even among the Mestizoes and the Creoles; but the Indians, distrusting the sincerity of their new allies, soon began a war of extermination against every one not of their own race. Jose Gabriel Tupac-Amaru, of whom I possess letters in which he stiles himself Inca of Peru, was not so cruel as his brother Diego, and especially his nephew Andres Condorcanqui, who, at the age of 17, displayed great talents but a sanguinary character. This insurrection, which appears to me very little known in Europe, lasted nearly two

years. I shall give more minute information with regard to it in the historical account of my travels. Tupac-Amaru had made himself master of the provinces of Quispicanchi, Tinta, Lampa, Azangara, Caravaja, and Chumbivilcas, when the Spaniards made him and his family prisoners. They were all quartered in the city of Cusco.

The respect with which the pretended Inca had inspired the natives was so great, that, notwithstanding their fear of the Spaniards, and though they were surrounded by the soldiers of the victorious army, they prostrated themselves at the sight of the last of the children of the sun, as he passed along the streets to the place of execution. The brother of Jose Gabriel Condorcanqui, known by the name of Diego Christobal Tupac-Amaru, was executed long after the termination of this revolutionary movement of the Peruvian Indians. When the chief fell into the hands of the Spaniards, Diego surrendered himself voluntarily, to profit by the pardon promised him in the name of the king. A formal convention was signed between him and the Spanish general, on the 26th January 1782, at the Indian village of Siquani, situated in the province of Tinta. He lived tranquilly in his family, till through an insidious and distrustful policy he was arrested on pretext of a new conspiracy.

The horrors exercised by the natives of Peru towards the whites in 1781 and 1782 in the

Cordillera of the Andes were repeated in part, twenty years after, in the trifling insurrections which took place in the plain of Riobamba. It is therefore of the greatest importance, even for the security of the European families established for ages in the continent of the new world, that they should interest themselves in the Indians, and rescue them from their present barbarous, abject, and miserable condition.

CHAPTER VII.

Whites, Creoles, and Europeans.—Their civilization.—Inequality of their fortunes.—Negros.—Mixed casts.—Proportion between the sexes.—Longevity according to the difference of races.—Sociability.

AMONGST the inhabitants of pure origin the whites would occupy the second place, considering them only in the relation of number. They are divided into whites born in Europe, and descendants of Europeans born in the Spanish colonies of America or in the Asiatic islands. The former bear the name of *Chapetones* or *Gachupines*, and the second that of *Criollos*. The natives of the Canary islands, who go under the general denomination of *Isleños* (islanders), and who are the *gerans* of the plantations, are considered as Europeans. The Spanish laws allow the same rights to all whites; but those who have the execution of the laws endeavour to destroy an equality which shocks the European pride. The government, suspicious of the Creoles, bestows the great places exclusively on the natives of Old Spain. For some years back they have disposed at Madrid even of the most trifling employments in the administration of the customs and the tobacco revenue. At an epoch

when every thing tended to a uniform relaxation in the springs of the state, the system of venality made an alarming progress. For the most part it was by no means a suspicious and distrustful policy, it was pecuniary interest alone which bestowed all employments on Europeans. The result has been a jealousy and perpetual hatred between the Chapetons and the Creoles. The most miserable European, without education, and without intellectual cultivation, thinks himself superior to the whites born in the new continent. He knows that, protected by his countrymen, and favoured by chances common enough in a country where fortunes are as rapidly acquired as they are lost, he may one day reach places to which the access is almost interdicted to the natives, even to those of them distinguished for their talents, knowledge, and moral qualities. The natives prefer the denomination of *Americans* to that of Creoles. Since the peace of Versailles, and, in particular, since the year 1789, we frequently hear proudly declared, "I am not a *Spaniard*, I am an *American!*" words which betray the workings of a long resentment. In the eye of law every white Creole is a Spaniard; but the abuse of the laws, the false measures of the colonial government, the example of the United States of America, and the influence of the opinions of the age, have relaxed the ties which formerly united more closely the Spanish Creoles to the European Spaniards. A wise ad-

ministration may re-establish harmony, calm their passions and resentments, and yet preserve for a long time the union among the members of one and the same great family scattered over Europe and America, from the Patagonian coast to the north of California.

The number of individuals of whom the white race is composed *(Casta de los blancos o de los Españoles)* amounts, probably, in all New Spain to 1,200,000, of whom nearly the fourth part inhabited the *provincias internas*. In New Biscay, or in the intendancy of Durango, there is hardly an individual subject to the *tributo*. Almost all the inhabitants of these northern regions pretend to be of pure European extraction.

In the year 1793 they reckoned:

In the intendancy of Guanaxuato on a total population of	*Souls.* 398,000	*Spaniards.* 103,000
Valladolid	290,000	80,000
Puebla	638,000	63,000
Oaxaca	411,000	26,000

Such is the simple result of the enumeration, making none of the changes requisite from the imperfection of that operation which we discussed in the fifth chapter. Consequently, in the four intendancies adjoining the capital, we find 272,000 whites, either Europeans or descendants of Europeans, in a total population of 1,737,000 souls. For every hundred inhabitants, there were:

In the intendancy of Valladolid,	.	27 whites.
Guanaxuato	.	25
Puebla	.	9
Oaxaca	.	6

These considerable differences show the degree of civilization to which the ancient Mexicans had attained south from the capital. These southern regions were always the best inhabited. In the north, as we have already several times observed in the course of this work, the Indian population was more thinly sown. Agriculture has only begun to make any progress there since the period of the conquest.

It is curious to compare together the number of whites in the West Indies and in Mexico. The French part of St. Domingo contained in its happiest æra, 1788, on a surface of 1700 square leagues (25 to the degree) a smaller population than that of the intendancy of la Puebla. Page * estimates the population of St. Domingo at 520,000 inhabitants, among whom there were 40,000 whites, 28,000 people of colour, and 452,000

* Vol. ii. p. 5. In 1802 there were in the whole island of St. Domingo only 375,000 inhabitants, whereof 290,000 were labourers, 47,000 domestics, artisans, and sailors, and 37,000 soldiers. To what a degree must the population have diminished within the last six years! In the island of Barbadoes, the number of whites is greater than in any of the other islands; it amounts to 16,000, on a total population of 80,000.

slaves. Hence, in St. Domingo, in every 100 souls, eight were white, six free people of colour, and eighty-six African slaves. Jamaica was computed in 1787 to have in every 100 inhabitants, ten whites, four people of colour, and eighty six slaves; and yet this English colony possesses a smaller population by one-third than the intendancy of Oaxaca. Hence, the disproportion between the Europeans or their descendants, and the casts of Indian or African blood, is still greater in the southern part of New Spain than in the French and English sugar islands. The island of Cuba, on the contrary, exhibits even at this day in the distribution of the races a very great and a very consolatory difference. From the most careful statistical researches which I was enabled to make during my stay at the Havanah, in 1800 and 1804, I found that at the last of these epochs the total population of the island of Cuba amounted to 432,000 souls, among whom there were

A. Freemen.	.	.	324,000
Whites	234,000		
People of colour	90,000		
B. Slaves	.	.	108,000
	Total		432,000

or in every 100 inhabitants, fifty-four Creole and European whites, twenty-one men of colour, and

twenty-five slaves. The proportion of freemen to slaves is there as three to one, while at Jamaica they are as one to six.

The following table exhibits the proportion of the other casts to the whites in the different parts of the new continent. Out of every 100 inhabitants, we reckon

In the United States of North America	83 whites,
Island of Cuba	54
Kingdom of New Spain (without including the *provincias internas*)	16
Kingdom of Peru	12
Island of Jamaica	10

In the capital of Mexico, according to the enumeration of the Count de Revillagigedo, in every 100 inhabitants, forty-nine are Spanish Creoles, two Spaniards born in Europe, twenty-four Aztec and Otomite Indians, and twenty-five people of mixed blood. The exact knowledge of these proportions is of the utmost importance to those who have the superintendence of the colonies.

It would be difficult to estimate exactly how many Europeans there are among the 1,200,000 whites who inhabit New Spain. As in the capital of Mexico itself, where the government brings together the greatest number of Spaniards, in a population of more than 135,000 souls, not more than

2500 individuals are born in Europe, it is more than probable that the whole kingdom does not contain more than 70 or 80,000. They constitute, therefore, only the 70th part of the whole population, and the proportion of Europeans to white Creoles is as one to fourteen.

The Spanish laws prohibit all entry into the American possessions to every European not born in the peninsula. The words European and Spaniard are become synonimous in Mexico and Peru. The inhabitants of the remote provinces have therefore a difficulty in conceiving that there can be Europeans who do not speak their language; and they consider this ignorance as a mark of low extraction, because, every where around them, all, except the very lowest class of the people, speak Spanish. Better acquainted with the history of the sixteenth century than with that of our own times, they imagine that Spain continues to possess a decided preponderance over the rest of Europe. To them the peninsula appears the very centre of European civilization. It is otherwise with the Americans of the capital. Those of them who are acquainted with the French or English literature fall easily into a contrary extreme; and have still a more unfavourable opinion of the mother country than the French had at a time when communication was less frequent between Spain and the rest of Europe. They prefer strangers from other countries to the

Spaniards; and they flatter themselves with the idea that intellectual cultivation has made more rapid progress in the colonies than in the peninsula.

This progress is indeed very remarkable at the Havanah, Lima, Santa Fe, Quito, Popayan, and Caraccas. Of all these great cities the Havanah bears the greatest resemblance to those of Europe in customs, refinements of luxury, and the tone of society. At Havanah the state of politics and their influence on commerce is best understood. However, notwithstanding the efforts of the *patriotic society of the island of Cuba*, which encourages the sciences with the most generous zeal, they prosper very slowly in a country where cultivation and the price of colonial produce engross the whole attention of the inhabitants. The study of the mathematics, chemistry, mineralogy, and botany, is more general at Mexico, Santa Fe, and Lima. We every where observe a great intellectual activity, and among the youth a wonderful facility of seizing the principles of science. It is said that this facility is still more remarkable among the inhabitants of Quito and Lima than at Mexico and Santa Fe. The former appear to possess more versatility of mind and a more lively imagination; while the Mexicans and the natives of Santa Fe have the reputation of greater perseverance in the studies to which they have once addicted themselves.

No city of the new continent, without even ex-

cepting those of the United States, can display such great and solid scientific establishments as the capital of Mexico. I shall content myself here with naming the School of Mines, directed by the learned Elhuyar, to which we shall return when we come to speak of the mines; the Botanic Garden; and the Academy of Painting and Sculpture. This academy bears the title of *Academia de los Nobles Artes de Mexico.* It owes its existence to the patriotism of several Mexican individuals, and to the protection of the minister Galvez. The government assigned it a spacious building, in which there is a much finer and more complete collection of casts than is to be found in any part of Germany. We are astonished on seeing that the Apollo of Belvidere, the group of Laocoon, and still more colossal statues, have been conveyed through mountainous roads at least as narrow as those of St. Gothard; and we are surprised at finding these masterpieces of antiquity collected together under the torrid zone, in a table land higher than the convent of the great St. Bernard. The collection of casts brought to Mexico cost the king 200,000 francs *. The remains of the Mexican sculpture, those colossal statues of basaltes and porphyry, which are covered with Aztec hieroglyphics, and bear some relation to the Egyptian and Hindoo style, ought to be collected together in

* 8334*l.* sterling.

the edifice of the academy, or rather in one of the courts which belong to it. It would be curious to see these monuments of the first cultivation of our species, the works of a semibarbarous people inhabiting the Mexican Andes, placed beside the beautiful forms produced under the sky of Greece and Italy.

The revenues of the Academy of Fine Arts at Mexico amount to 125,000 francs *, of which the government gives 60,000, the body of Mexican miners nearly 25,000, the *consulado*, or association of merchants of the capital, more than 1500. It is impossible not to perceive the influence of this establishment on the taste of the nation. This influence is particularly visible in the symmetry of the buildings, in the perfection with which the hewing of stone is conducted, and in the ornaments of the capitals and stucco relievos. What a number of beautiful edifices are to be seen at Mexico! nay, even in provincial towns like Guanaxato and Queretaro! These monuments, which frequently cost a million and a million and a half of francs †, would appear to advantage in the finest streets of Paris, Berlin, and Petersburg. M. Tolsa, professor of sculpture at Mexico, was even able to cast an equestrian statue of King Charles the Fourth; a work which, with the exception of the Marcus

* 5208*l.* sterling. *Trans.*

† 41,670*l.* and 62,505*l.* *Trans.*

Aurelius at Rome, surpasses in beauty and purity of stile every thing which remains in this way in Europe. Instruction is communicated *gratis* at the Academy of Fine Arts. It is not confined alone to the drawing of landscapes and figures; they have had the good sense to employ other means for exciting the national industry. The academy labours successfully to introduce among the artisans a taste for elegance and beautiful forms. Large rooms, well lighted by Argand's lamps, contain every evening some hundreds of young people, of whom some draw from relievo or living models, while others copy drawings of furniture, chandeliers, or other ornaments in bronze. In this assemblage (and this is very remarkable in the midst of a country where the prejudices of the nobility against the casts are so inveterate) rank, colour, and race is confounded: we see the Indian and the Mestizo sitting beside the white, and the son of a poor artisan in emulation with the children of the great lords of the country. It is a consolation to observe, that under every zone the cultivation of science and art establishes a certain equality among men, and obliterates for a time, at least, all those petty passions of which the effects are so prejudicial to social happiness.

Since the close of the reign of Charles the Third, and under that of Charles the Fourth, the study of the physical sciences has made great progress, not only in Mexico, but in general in all the

Spanish colonies. No European government has sacrificed greater sums to advance the knowledge of the vegetable kingdom than the Spanish government. Three *botanical expeditions*, in Peru, New Grenada, and New Spain, under the direction of MM. Ruiz and Pavon, Don Jose Celestino Mutis, and MM. Sesse and Mociño, have cost the state nearly two millions of francs *. Moreover, botanical gardens have been established at Manilla and the Canary islands. The commission destined to draw plans of the canal of *los Guines* was also appointed to examine the vegetable productions of the island of Cuba. All these researches, conducted during twenty years in the most fertile regions of the new continent, have not only enriched science with more than four thousand new species of plants, but have also contributed much to diffuse a taste for natural history among the inhabitants of the country. The city of Mexico exhibits a very interesting botanical garden within the very precincts of the viceroy's palace. Professor Cervantes gives annual courses there, which are very well attended. This *savant* possesses, besides his herbals, a rich collection of Mexican minerals. M. Mociño, whom we just now mentioned as one of the coadjutors of M. Sesse, and who has pushed his laborious excursions from the kingdom of Guatimala to the north-west coast or island of

* £3,340*l.* sterling. *Trans.*

Vancouver and Quadra; and M. Echeveria, a painter of plants and animals, whose works will bear a comparison with the most perfect productions of the kind in Europe, are both of them natives of New Spain. They had both attained a distinguished rank among *savans* and artists before quitting their country*.

The principles of the new chemistry, which is known in the Spanish colonies by the equivocal appellation of new philosophy (*nueva filosofia*), are more diffused in Mexico than in many parts of the peninsula. A European traveller cannot undoubtedly but be surprised to meet in the interior of the country, on the very borders of California, with young Mexicans who reason on the decomposition of water in the process of amalgamation with free air. The School of Mines possesses a chemical laboratory; a geological collection, arranged according to the system of Werner; a physical cabinet, in which we not only find the valuable instruments of Ramsden, Adams, Le Noir,

* The public is only yet put in possession of the discoveries of the botanical expedition of Peru and Chili. The great herbals of M. Sesse, and the immense collection of drawings of Mexican plants executed under his eye, arrived at Madrid in 1803. The publication of both the Flora of New Spain and the Flora of Santa Fe de Bogota is expected with impatience. The latter is the fruit of 40 years researches and observations by the celebrated Mutis, one of the greatest botanists of the age.

and Louis Berthoud, but also models executed in the capital even, with the greatest precision, and from the finest wood in the country. The best mineralogical work in the Spanish language was printed at Mexico, I mean the Manual of Oryctognosy, composed by M. del Rio, according to the principles of the school of Freyberg, in which the author was formed. The first Spanish translation of Lavater's Elements of Chemistry was also published at Mexico. I cite these insulated facts because they give us the measure of the ardour with which the exact sciences are begun to be studied in the capital of New Spain. This ardour is much greater than that with which they addict themselves to the study of languages and ancient literature*.

* This is as much as to say that taste is rather at a low ebb among them, and that imagination is in a somewhat similar state; for wherever taste and imagination flourish an admiration for the ancients is seen to prevail. The observation of Humboldt may perhaps receive a much more extensive application; and it may peculiarly be applied to the whole of America. I have seen it asserted that there are whole states in the union where a classical seminary of any kind is not to be found. It would be rash to say that the faculties of men transplanted to America gradually assimilate to those of the aborigines, who are stated by M. Humboldt to be destitute of taste, but excellently adapted for science. Should we not rather say that every age has its favourite study, which it cultivates almost to the neglect of every other? At one time it is all commenting and comparing manuscripts:—

"And A's deposed and B with pomp restored:"

Instruction in mathematics is less carefully attended to in the university of Mexico than in the School of Mines. The pupils of this last establishment go farther into analysis; they are instructed in the integral and differential calculi. On the return of peace and free intercourse with Europe, when astronomical instruments (chronometers, sextants, and the repeating circles of Borda) shall become more common, young men will be found in the most remote parts of the kingdom capable of making observations, and calculating them after the most recent methods. I have already indicated in the analysis of my maps the advantage which might be drawn by the government from this extraordinary aptitude in constructing a map of the country. The taste for astronomy is very old in Mexico. Three distinguished men, Velasquez, Gama, and Alzate, did honour to their country towards the end of the last century. All the three made a great number of astronomical observations, especially of eclipses of the satellites of Jupiter. Alzate, the worst informed of them, was the correspondent of the Academy of Sciences

at another, the philosophy of Plato and Aristotle divide the world between them; from that a transition is made to poetry, and no man can be great without producing an epic poem or a handsome volume of sonnets; and in the present age almost every thing but the refuse of talent carefully preserved in the cells of some fat old university, seems employed, more or less, in physical science. *Trans.*

at Paris. Inaccurate as an observer, and of an activity frequently impetuous, he gave himself up to too many objects at a time. We have already discussed in the geographical introduction the merits of his astronomical labours. He is entitled to the real merit, however, of having excited his countrymen to the study of the physical sciences. The *Gazetta* de Litteratura, which he published for a long time at Mexico, contributed singularly to give encouragement and impulsion to the Mexican youth.

The most remarkable geometrician produced by New Spain since the time of Siguenza was Don Joacquin Velasquez Cardinas y Leon. All the astronomical and geodesical labours of this indefatigable *savant* bear the stamp of the greatest precision. He was born on the 21st July, 1732, in the interior of the country, at the farm of Santiago Acebedocla, near the Indian village of Tizicapan; and he had the merit, we may say, of forming himself. At the age of four he communicated the small-pox to his father, who died of them. An uncle, parish priest of Xaltocan, took care of his education, and placed him under the instruction of an Indian of the name of Manuel Asentzio; a man of great natural strength of mind, and well versed in the knowledge of the Mexican history and mythology. Velasquez learned at Xaltocan several Indian languages, and the use of the hieroglyphical writings of the Az-

tecs. It is to be regretted that he published nothing on this very interesting branch of antiquity. Placed at Mexico in the Tridentine college, he found neither professor nor books nor instruments*. With the small assistance which he could obtain, he fortified himself in the study of the mathematics and the ancient languages. A lucky accident threw into his hands the works of Newton and Bacon. He drew from the one a taste for astronomy, and from the other an acquaintance with the true methods of philosophising. While poor and unable to find any instrument even in Mexico, he set himself, with his friend M. Guadalaxara (now professor of mathematics in the Academy of Painting), to construct telescopes and quadrants. He followed at the same time the profession of advocate, an occupation which at Mexico, as well as elsewhere, is much more lucrative than that of looking at the stars. What he gained by his professional labours was laid out in purchasing instruments in England. After being named professor in the university, he accompanied the *visitador* Don Jose de Galvez† in his journey

* From this we may discover that the professors of this university are not behind those of some others in the praiseworthy custom of considering their chairs as sinecures. *Trans.*

† The Count de Galvez, before obtaining the ministry of the Indies, travelled through the northern part of New Spain with the title of *visitador*. This name is given to persons

to Sonora. Sent on a commission to California, he profited by the serenity of the sky in that peninsula to make a great number of astronomical observations. He first observed there that in all the maps, for centuries, through an enormous error of longitude, this part of the new continent had always been marked several degrees farther west than it really was. When the Abbe Chappe, more celebrated for his courage and his zeal for the sciences than for the accuracy of his labours, arrived in California, he found the Mexican astronomer already established there. Velasquez had constructed for himself in Mimosa planks an observatory at St. Anne. Having already determined the position of this Indian village, he informed the Abbe Chappe that the moon's eclipse on the 18th June, 1769, would be visible in California. The French astronomer doubted the truth of this assertion, till the eclipse actually took place. Velasquez by himself made a very good observation of the transit of Venus over

employed by the court to procure information as to the state of the colonies. Their journey (*visita*) has generally no other effect than that of counterbalancing for some time the power of the viceroys and the *audiencias*, of receiving an infinity of memoirs, petitions, and projects, and of signalizing their stay by the introduction of some new impost. The people expect the arrival of the *visitadores* with the same impatience which they afterwards display for their departure.

the disk of the sun on the 3d June, 1769. He communicated the result, the very morning of the transit, to the Abbe Chappe, and to the Spanish astronomers Don Vicente Doz, and Don Salvador de Medina. The French traveller was surprised at the harmony between the observation of Velasquez and his own. He was no doubt astonished to meet in California with a Mexican, who, without belonging to any academy, and without having ever left New Spain, was able to observe as well as the academicians. In 1773 Velasquez executed the great geodesical undertaking, of which we have given some of the results in the geographical introduction, and to which we shall again return in speaking of the drain of the lakes of the valley of Mexico. The most essential service which this indefatigable man rendered to his country was the establishment of the *Tribunal* and the School of Mines, the plans for which he presented to the court. He finished his laborious career on the 6th March, 1786, while first director-general of the *Tribunal de Mineria*, and enjoying the title of *Alcalde del Corte honorario*.

After mentioning the labours of Alzate and Velasquez, it would be unjust to pass over the name of Gama, the friend and fellow labourer of the latter. Without fortune, and compelled to support a numerous family by a troublesome and almost mechanical labour, unknown and neg-

lected during his life by his fellow citizens*, who loaded him with eulogies after his death. Gama became by his own unassisted efforts an able and well informed astronomer. He published several memoirs on eclipses of the moon, on the satellites of Jupiter, on the almanac and chronology of the ancient Mexicans, and on the climate of New Spain; all of which announce a great precision of ideas and accuracy of observation. If I have allowed myself to enter into these details on the literary merit of three Mexican *savans*, it is merely for the sake of proving from their example, that the ignorance which European pride has thought proper to attach to the Creoles is neither the effect of the climate nor of a want of moral energy; but that this ignorance, where it is still observable, is solely the effect of the insulation, and the defects in the social institutions of the colonies.

If, in the present state of things, the cast of whites is the only one in which we find almost exclusively any thing like intellectual cultivation, it is also the only one which possesses great wealth. This wealth is unfortunately still more unequally

* The celebrated navigator Alexander Malaspina, during his stay at Mexico, observed along with Gama. He recommended him with much warmth to the court, as is proved by the official letters of Malaspina, preserved in the archives of the viceroy.

distributed in Mexico than in the *capitania general* of Caraccas, the Havanah, and especially Peru. At Caraccas, the heads of the richest families possess a revenue of 200,000 livres*. In the island of Cuba we find revenues of more than 6 or 700,000 francs†. In these two industrious colonies agriculture has founded more considerable fortunes than has been accumulated by the working of the mines in Peru. At Lima an annual revenue of 80,000 francs is very uncommon‡. I know in reality of no Peruvian family in the possession of a fixed and sure revenue of 130,000 francs§. But in New Spain there are individuals who possess no mines, whose revenue amounts to a million of francs‖. The family of the Count *de la Valenciana*, for example, possesses alone, on the ridge of the Cordillera, a property worth more than 25 millions of francs¶, without including the mine of Valenciana near Guanaxuato, which, *communibus annis*, yields a nett revenue of a million and a half of livres**. This family, of which the present head, the young Count de Valenciana, is distinguished for a generous character and a noble desire of instruction, is only divided into three

* 8334l. sterling. *Trans.*

† 25,002l. or 29,169l. sterling. *Trans.*

‡ 3333l. sterling. *Trans.*

§ 5417l. sterling. *Trans.*

‖ 41,670l. sterling. *Trans.*

¶ 1,041,750l sterling. *Trans.*

** 62,505l. sterling. *Trans.*

branches; and they possess altogether, even in years when the mine is not very lucrative, more than 2,200,000 francs of revenue*. The Count de *Regla*, whose youngest son, the Marquis de San Christobal †, distinguished himself at Paris for his physical and physiological knowledge, constructed at the Havanah, at his own expence, in acajou and cedar (*cedrella*) wood, two vessels of the line of the largest size, which he made a present of to his sovereign. It was the seam of la Biscaina, near Pachuca, which laid the foundation of the fortune of the house of Regla. The family of *Fagoaga*, well known for its beneficence, intelligence, and zeal for the public good, exhibits the example of the greatest wealth which was ever derived from a mine. A single seam which the family of the Marquis of Fagoaga possesses in the district of Sombrerete left in five or six months, all charges deducted, a nett profit of 20 millions of francs ‡.

From these data one would suppose capitals in the Mexican families infinitely greater than what are really observed. The deceased Count de la

* 91,67*l.* sterling. *Trans.*

† M. Terreros (this is the name by which this modest savant is known in France) preferred for a long time the instruction which his abode at Paris enabled him to procure, to the great fortune which he could only enjoy living in Mexico.

‡ 833,400*l.* sterling. *Trans.*

Valenciana, the first of the title, sometimes drew from his mine alone, in one year, a nett revenue of no less than six millions of livres *. This annual revenue, during the last twenty-five years of his life, was never below from two to three millions of livres †; and yet this extraordinary man, who came without any fortune to America, and who continued to live with great simplicity, left only behind him at his death, besides his mine, which is the richest in the world, ten millions in property and capital ‡. This fact, which may be relied on, will not surprise those who are acquainted with the interior management of the great Mexican houses. Money rapidly gained is as rapidly spent. The working of mines becomes a game in which they embark with unbounded passion. The rich proprietors of mines lavish immense sums on quacks, who engage them in new undertakings in the most remote provinces. In a country where the works are conducted on such an extravagant scale, that the pit of a mine frequently requires two millions of francs to pierce, the bad success of a rash project may absorb in a few years all that was gained in working the richest seams. We must add, that from the internal disorder which prevails in the greatest part of the

* 250,020l. sterling. *Trans.*

† From 83,340l. to 125,010l. *Trans.*

‡ 416,700l. sterling. *Trans.*

great houses of both Old and New Spain, the head of a family is not unfrequently straitened with a revenue of half a million*, though he display no other luxury than that of numerous yokes of mules.

The mines have undoubtedly been the principal sources of the great fortunes of Mexico. Many miners have laid out their wealth in purchasing land, and have addicted themselves with great zeal to agriculture. But there is also a considerable number of very powerful families who have never had the working of any very lucrative mines. Such are the rich descendants of Cortez or the *Marquis del Valle*. The Duke of Monteleon, a Neapolitan lord, who is now the head of the house of Cortez, possesses superb estates in the province of Oaxaca, near Toluca, and at Cuernavaca. The nett produce of his rents is actually no more than 550,000 francs†, the king having deprived the duke of the collection of the alcavalas and the duties on tobacco. The ordinary expenses of management amount to more than 125,000 francs‡. However, several governors of the marquesado have become singularly wealthy. *If* the descendants of the great *conquistador* would only live in Mexico, their revenue would immediately rise to more than a million and a half §."

* 20,835l. sterling. *Trans.*

† 22,918l. sterling. *Trans.*

‡ 5208l. sterling. *Trans.*

§ 62,505l. sterling. *Trans.*

To complete the view of the immense wealth centered in the hands of a few individuals in New Spain, which may compete with any thing in Great Britain, or the European possessions in Hindostan, I shall add several exact statements both of the revenues of the Mexican clergy, and the pecuniary sacrifices annually made by the body of miners (*cuerpo de mineria*) for the improvement of mining. This last body, formed by a union of the proprietors of mines, and represented by deputies who sit in the *Tribunal de Mineria*, advanced in three years, between 1784 and 1787, a sum of four millions of francs* to individuals who were in want of the necessary funds to carry on great works. It is believed in the country that this money has not been very usefully employed (*para habilitar*); but its distribution proves the generosity and opulence of those who are able to make such considerable largesses. A European reader will be still more astonished when I inform him of the extraordinary fact, that the respectable family of Fagoagas lent, a few years ago, without interest, a sum of more than three millions and a half of francs† to a friend, whose fortune they were in the belief would be made by it in a solid manner; and this sum was irrevocably lost in an unsuccessful new mining undertaking. The architectural works which are carried on in the ca-

* 166,680*l.* sterling. *Trans.* † 145,845*l.*

pital of Mexico for the embellishment of the city are so expensive, that notwithstanding the low rate of wages, the superb edifice constructed by order of the *Tribunal de Mineria* for the School of Mines will cost at least three millions of francs*, of which two millions were in readiness before the foundation was laid. To hasten the construction, and particularly to furnish the students immediately with a proper laboratory for metallic experiments on the amalgamation of great masses of minerals (*beneficio de patio*), the body of Mexican miners contributed monthly, in the year 1803 alone, the sum of 50,000 livres†. Such is the facility with which vast projects are executed in a country where wealth is divided among a small number of individuals.

This inequality of fortune is still more conspicuous among the clergy, of whom a number suffer extreme poverty, while others possess revenues which surpass those of many of the sovereign princes of Germany. The Mexican clergy, less numerous than is believed in Europe, is only composed of ten thousand individuals, the half of whom are regulars who wear the cowl. If we include lay brothers and sisters, or servants (*legos, donados y criados de los conventos*), all those who are not in orders, we may estimate the clergy

* 125,010l. sterling. *Trans.* † 2083l. sterling.

at 13 or 14,000 individuals*. Now the annual revenue of the eight Mexican bishops in the fol-

* The number of monks of St. Francis in Spain amounts to 15,000, more than all the ecclesiastics of the kingdom of Mexico. The clergy in the peninsula exceed 228,000 individuals. For every thousand inhabitants there are 20 ecclesiastics, while in New Spain there are not above two to the thousand. The following is a specification of the clergy in several of the intendancies, according to the enumeration in 1793:

In the intendancy of la Puebla,	667	secular ecclesiastics or *clerigos*, and	881 regulars.
Valladolid	293	. . .	298
Guanaxuato	225	. . .	197
Oaxaca	306	. . .	342
In the city of Mexico	550	. . .	1646

Including in the enumeration the *Donados*, or lay brothers, the convents of the capital contain more than 2,500 individuals.—*Author.*

The clergy of the peninsula, according to M. de La Borde, from whom M. de Humboldt elsewhere professes to take his information regarding Spain, amounts to 147,657 individuals; and according to M. Townsend, who cites the returns made to the Spanish government, they amount to 115,625. M. de La Borde estimates the population of Spain at 11,000,000, and he states the proportion of the clergy to the population as 1 : 69; though $\frac{11,000,000}{147,657} = 74,497$, say $74\frac{1}{2}$, and not 69. But the estimate of 228,000 clergy, and a corresponding proportion of 20 in the thousand, or 1 in 50 to the population, is in every way much beyond the truth. M. de Humboldt having found from M. de la Borde that the proportion between the clergy and population in Madrid was 20 : 1,000,

lowing list amounts to a sum total of 2,695,000 francs *:

		Double piastres.
Revenues of the Archbishop of	Mexico	130,000
Bishop of la	Puebla	110,000 -
	Valladolid	100,000 -
	Guadalaxara	90,000 -
	Durango	35,000 -
	Monterey	80,000 -
	Yucatan	20,000 -
	Oaxaca	18,000 -
	Sonora	6,000 -
		539,000 †

The bishop of Sonora, the poorest of them all, does not draw tithes. He is paid like the bishop

has been led to extend the same proportion over all Spain. Yet he afterwards, in the Statistical Analysis, states it as a peculiar merit in M. de La Borde, that he had first proved that the proportion of Spanish clergy to the population was less than that of the French clergy to the population before the revolution, which was 460,078 : 25,000,000 = 1 : 54,444, say $54\frac{4}{10}$ (and not 1 : 52, as La Borde calculates:) but a clergy of 228,000 in a population of 11 millions would be more numerous in proportion than that of France before the revolution.—*Trans.*

* 112,300l. sterling. *Trans.*

† This, at the rate of conversion which the author lays down in a note in the following page, namely five francs five sous per double piastre, does not amount to the sum of 2,695,000, but 2,829,750 francs = 117,915l.—*Trans.*

of Panama immediately by the king (*de Caxas reales*). His income amounts only to the 20th part of that of the bishops of Valladolid and Mechoacan; and, what is truly distressing in the diocese of an archbishop whose revenue amounts to the sum of 650,000 francs*, there are clergymen of Indian villages whose yearly income does not exceed five or six hundred francs†. The bishop and chapter of Valladolid sent, at different times, to the king as a voluntary contribution, particularly during the last war against France, the sum of 810,000 francs‡. The lands of the Mexican clergy (*bienes raices*) do not exceed the value of 12 or 15 millions of francs§; but the clergy possess immense capitals hypothecated on the property of individuals. The whole of these capitals (*capitales de Capellanias y obras pias, fondos lotales de Communidades religiosas*), of which we shall give a detail in the sequel, amounts to the sum of 44 millions and a half of double piastres‖, or 233,625,000 francs¶. Cortez, from the very

* 27,085*l.* sterling. *Trans.*

† From 20*l.* to 25*l.* sterling. *Trans.*

‡ 33,752*l.* sterling. *Trans.*

§ From 500,040*l.* to 625,050*l.* sterling. *Trans.*

‖ 13,485,453*l.* sterling. *Trans.*

¶ I have followed the data contained in the *Representacion de los vecinos de Valladolid al Excellentissimo Señor Virey* (dated 24th October, 1805), a manuscript memoir of great value. I compute in the course of this work the double piastre at 5 livres 5 sous. Its intrinsic value is 5 livres 8½ sous,

commencement of the conquest, dreaded the great opulence of the clergy in a country where ecclesiastical discipline is difficult to maintain. He says very frankly in a letter to Charles the Fifth, "that he beseeches his majesty to send out to the Indies *religieux* and not *canons*, because the latter disp'ay an extravagant luxury, leave great wealth to their natural children, and give great scandal to the newly converted Indians." This advice, dictated by the frankness of an old soldier, was not followed at Madrid. We have transcribed this curious passage from a work published several years ago by a cardinal*. It is not for us to accuse the conqueror of New Spain of predilection for the regular clergy, or antipathy towards the canons.

The rumour spread up and down Europe of the immensity of the Mexican wealth has given rise to very exaggerated ideas relative to the abundance of gold and silver employed in New Spain in plate, furniture, kitchen utensils, and harness. A traveller, whose imagination has been heated by

We must not confound the *peso*, which is sometimes called *pezo sencillo* or *commercial piastre*, which is a fictitious money, with the *double piastre* of America, or *te duro*, or *te pezo duro*. The double piastre contains 20 reals of vellon, or 170 *quartos*, or 680 *maravedis*, while the *pezo sencillo*, which is equal to 3 livres 15 sous, contains only 15 reals of vellon, or 510 maravedis.

* Archbishop Lorenzana.

stories of keys, locks, and hinges of massy silver, will be very much surprised on his arrival at Mexico at seeing no more of the precious metals employed for domestic uses there than in Spain, Portugal, and the rest of the south of Europe; and he will be as much astonished at seeing in Mexico, Peru, or at Santa Fe, people of the lowest order barefooted with enormous silver spurs on, or at finding silver cups and plates a little more common there than in France and England. The surprise of the traveller will cease when he reflects that porcelain is very rare in these newly civilized regions, that the nature of the roads in the mountains renders the carriage of it extremely difficult; and that in a country of little commercial activity, it is equally indifferent whether a few hundred piastres be possessed in specie or in plate. Notwithstanding, however, the enormous difference of wealth between Peru and Mexico, considering merely the fortunes of the great proprietors, I am inclined to believe that there is more true comfort at Lima than at Mexico. The inequality of fortunes is much less in the former; and if it is very rare, as we have already observed, to find individuals there who possess a revenue of 50 or 60,000 francs*, we meet, however, with a great number of mulatto artisans and free negros, who, by their industry alone, procure much more than the ne-

* 2,083*l.* or 2,500*l.* sterling. *Trans.*

cessaries of life. Capitals of 10 and 15000 piastres* are very common among this class, while the streets of Mexico swarm with from twenty to thirty thousand wretches (*Saragates, Guachinangos*), of whom the greatest number pass the night *sub dio*, and stretch themselves out to the sun during the day with nothing but a flannel covering. These dregs of the people bear much analogy to the Lazaroni of Naples. Lazy, careless, and sober like them, the Guachinangos have nothing, however, ferocious in their character, and they never ask alms; for if they work one or two days in the week, they earn as much as will purchase their pulque, or some of the ducks with which the Mexican lakes are covered, which are roasted in their own fat. The fortune of the Saragates seldom exceeds two or three reals, while the lower people of Lima, more addicted to luxury and pleasure, and perhaps also more industrious, frequently spend two or three piastres in one day. One would say that the mixture of the European and the negro every where produces a race of men more active and more assiduously industrious than the mixture of the whites with the Mexican Indian.

The kingdom of New Spain is, of all the European colonies under the torrid zone, that in

* If single or commercial piastres = 166*l.* and 234*l.* sterling. *Trans.*

which there are the fewest negros. We may almost say that there are no slaves. We may go through the whole city of Mexico without seeing a black countenance. The service of no house is carried on with slaves. In this point of view especially, Mexico presents a singular contrast to the Havanah, Lima, and Caraccas. From exact information procured by those employed in the enumeration of 1793, it appears that in all New Spain there are not six thousand negros, and not more than nine or ten thousand slaves, of whom the greatest number belong to the ports of Acapulco and Vera Cruz, or the warm regions of the coasts (*tierras calientes*). The slaves are four times more numerous in the *capitania general* of Caraccas, which does not contain the sixth part of the population of Mexico. The negros of Jamaica are to those of New Spain in the proportion of 250 to 1! In the West India islands, Peru, and even Caraccas, the progress of agriculture and industry in general depends on the augmentation of negros. In the island of Cuba, for example, where the annual exportation of sugar has risen in twelve years from 400,000 to 1,000,000 quintals, between 1792 and 1803 nearly 55,000* slaves have been introduced. But in Mexico the increase

* According to the custom-house reports of the Havanah, of which I possess a copy, the introduction of negros, from 1791 to 1803, was 54,000, of whom 7 per cent. die annually.

of colonial prosperity is nowise occasioned by a more active slave trade. It is not above twenty years since Mexican sugar was known in Europe; Vera Cruz, at present, exports more than 120,000 quintals; and yet the progress of sugar cultivation which has taken place in New Spain since the revolution of St. Domingo has not perceptibly increased the number of slaves. Of the 74,000 negros annually furnished by Africa to the equinoxial regions of America and Asia, and which are worth in the colonies the sum of 111,000,000 francs*, not above 100 land on the coast of Mexico.

By the laws there can be no Indian slaves in the Spanish colonies; and yet by a singular abuse, two species of wars very different in appearance give rise to a state very much like that of the African slave. The missionary monks of South America make from time to time incursions into the countries possessed by peaceable tribes of Indians, whom they call savages (*Indios bravos*), because they have not learned to make the sign of the cross like the equally naked Indians of the missions (*Indios reducidos*). In these nocturnal incursions, dictated by the most culpable fanaticism, they lay hold of all whom they can surprise, especially children, women, and old men. They separate without pity children from their mothers,

* 4,625,370*l.* sterling. *Trans.*

lest they should concert together as to the means of escape. The monk who is chief of this expedition distributes the young people among the Indians of his mission who have the most contributed to the success of the *Entrados*. On the Orinoco, and on the banks of the Portuguese Rio Negro, these prisoners bear the name of *Poitos;* and they are treated like slaves till they are of an age to marry. The desire of having Poitos and making them work for eight or ten years induces the Indians of the missions to excite the monks to these incursions, which the bishops have generally had the good sense to blame, as the means of attaching odium to religion and its ministers. In Mexico the prisoners taken in the petty warfare which is carried on almost without interruption on the frontiers of the *provincias internas* experience a much more unhappy fate than the Poitos. They are generally of the nation of the Mecos or Apaches, and they are dragged to Mexico, where they languish in the dungeons of a correction-house (*la Cordada*). Their ferocity is increased by solitude and despair. Transported to Vera Cruz and the island of Cuba, they soon perish, like every savage Indian removed from the high table-land into the lower, and consequently hotter regions. These Mecos prisoners sometimes break from their dungeons, and commit the most atrocious cruelties in the surrounding countries. It is high time that the government interested itself in these unfor-

tunate persons, whose number is small, and their situation so much the easier to be ameliorated.

It appears that at the commencement of the conquest there were a great number of these prisoners of war at Mexico, who were treated as the slaves of the conquerors. I found on this subject a very remarkable passage in the testament of Hernan Cortez*, an historical monument worthy of being preserved from oblivion. This great captain, who, during the course of his victories, especially in his perfidious conduct towards the unfortunate Montezuma the Second, did not display much delicacy of conscience†, began towards

* *Testamento que otorgò el Excellentissimo Señor Don Hernan Cortez, Conquistador de la Nueva España hecho en Sevilla el* 11 *del mes de Octobre,* 1547. The original of this very curious document, of which I caused a copy to be taken, exists in the archives of the house *del Estado* (of the Marquis del Valle) situated in the *Plaza Mayor* of Mexico. I found also in these archives a memoir drawn up by Cortez, shortly after the siege of Tenochtitlan, containing instructions relative to the making of roads, establishment of inns on the great roads, and other objects of general police.

† Cortez, in his letters dated from la Ricca villa de Vera Cruz, describes the city of Tenochtitlan to the emperor Charles the Fifth as if he were speaking of the wonders of the capital of el Dorado. After transmitting to him all the information he could procure regarding the wealth "of the powerful Lord Montezuma," he assures his sovereign, that living or dead the Mexican king must fall into his hands. "*Certifiquè a Vuestra Alteza que lo habria preso o muerto o subdito a la Real Corona de Vuestra Magestad*" (Lorenzana, p.

the end of his career to entertain scruples as to the legitimacy of the titles by which he possessed immense property in Mexico. He orders his son to make the most careful enquiries into the tributes levied by the Mexican lords who were proprietors of his marquisate before the arrival of the Spaniards at Vera Cruz; and he even wishes that the value of the tributes exacted in his name above the imposts formerly paid should be restored to the natives. Speaking of the slaves in the 39th and 41st articles of his testament, Cortez adds the following memorable words: "As it is doubtful if a christian can conscientiously employ as slaves Indians who have been made prisoners of war, and as this point has never been rightly cleared up till this day, I order my son, Don Martin, and those of his descendants who shall possess my property after me, to take every possible information as to the rights which may be legally exercised towards prisoners. The natives, who after paying me tribute have been forced to yield personal service, ought to be indemnified, if it shall be decided in the sequel that these personal services ought not to have been demanded." From whom should we have expected decisions on such problematical questions as these, except from a pope or a coun-

39). We are to observe that this project was conceived while the Spanish general was yet on the coast, and had had no communication with the ambassadors of Montezuma.

cil? We must own that three centuries later, notwithstanding the civilization of a more enlightened age, the rich proprietors in America have less timorous consciences even on death-bed. In our days, it is not the devotees but the philosophers who call in question the justice of slavery! But the small influence which the empire of philosophy has always had induces us to believe that it would have been better for suffering humanity had this sort of scepticism still been preserved among believers*.

However, the slaves, who fortunately are in very small numbers in Mexico, are there, as in all the other Spanish possessions, somewhat more under the protection of the laws than the negros of the other European colonies. These laws are always interpreted in favour of liberty. The government wishes to see the number of freemen increased. A slave, who by his industry has procured a little money, may compel his master to give him his liberty on paying the moderate sum of 1500 or 2000 livres†. Liberty cannot be refused to a

* Had M. de Humboldt been acquainted with the history of the endeavours in this country to abolish the slave trade, he would have found that these endeavours were principally made by men whom he would call devotees, who acted under the influence of religious motives. The sect of quakers in particular, and this ought to cover a multitude of their absurdities, were always staunch enemies to slavery. *Trans.*

† 62*l.* or 83*l.* sterling. *Trans.*

negro on the pretext that he cost the triple of the sum, or that he possesses a particular talent for some lucrative employment. A slave who has been cruelly used acquires on that account his freedom by the law, if the judge do justice to the cause of the oppressed; but it may be easily conceived that this beneficent law must be frequently eluded. I saw, however, even in Mexico, in the month of July, 1803, an example of two negros to whom the magistrate, who exercised the functions of *alcalde de corte*, gave their liberty, because their mistress, a lady from the islands, had wounded them all over the body with scissars, pins, and knives. In the course of this shocking process, the lady was accused of having, with a key, knocked out the teeth of the slaves when they complained of a fluxion in the gums, which prevented them from working. The Roman matrons were not more ingenious in their punishments. Barbarity is the same in all ages, when men can indulge their passions without restraint, and when governments tolerate an order of things contrary to the laws of nature, and, consequently, to the welfare of society.

We have enumerated the different races of men who, at present, constitute the population of New Spain. On glancing our eyes over the physical views or sections which we have drawn up of this country, we see that the greater part of a nation of six millions of inhabitants may be considered as

highlanders. On the table-land of Anahuac, whose elevation surpasses at least twice that of the clouds which in summer are suspended over our heads, are assembled together copper-coloured men from the north-west part of North America, Europeans, and a few negros from the coasts of Bonny, Calabar, and Melimbo. When we consider that what we now call Spaniards is a mixture of Alani and other Tartar hordes with the Visigoths and ancient inhabitants of Iberia; when we also consider the striking analogy between the most part of the European languages, the Sanscrit, and the Persic; and, in short, when we reflect on the Asiatic origin of the pastoral tribes who have been pouring into Mexico since the seventh century, we are almost tempted to believe, that from one and the same centre, though by roads diametrically opposite, have issued part of those nations, who, wandering about for a long time, and after making, as it were, the tour of the globe, meet once more on the ridge of the Mexican Cordilleras.

To complete the table of the elements of which the Mexican population is composed, it remains for us to point out rapidly the differences of cast which spring from the mixture of the pure races with one another. These casts constitute a mass almost as considerable as the Mexican Indians. We may estimate the total of the individuals of mixed blood at nearly 2,400,000. From a refinement of vanity, the inhabitants of the colonies

have enriched their language with terms for the finest shades of the colours which result from the degeneration of the primitive colour. It may be so much the more useful to explain these denominations*, as they have been confounded by many travellers, and as this confusion frequently causes no small embarrassment to those who read Spanish works on the American possessions.

The son of a white (Creole or European), and a native of copper-colour, is called *Mestizo*. His colour is almost a pure white; and his skin is of a particular transparency. The small beard and small hands and feet, and a certain obliquity of the eyes, are more frequent indications of the mixture of Indian blood than the nature of the hair. If a *Mestiza* marry a white man, the second generation differs hardly in any thing from the European race. As very few negros have been introduced into New Spain, the Mestizos probably compose $\frac{7}{8}$ of the whole casts. They are generally accounted of a much more mild character than the *mulattoes*, descended from whites and negresses, who are distinguished for the violence of their passions and a singular volubility of tongue. The descendants of negros and Indian women bear at Mexico, Lima, and even at the Havanah, the strange name of *Chino*, Chinese.

* *Sobre el Clima de Lima, por el Doctor Unanue*, p. xlviii. a work printed in Peru, in 1806.

On the coast of Caraccas, and, as appears from the laws, even in New Spain, they are called *zambos*. This last denomination is now principally limited to the descendants of a negro and a female mulatto, or a negro and a Chinese female. From these common zambos, they distinguish the *zambos prietos*, who descend from a negro and a female zamba. From the mixture of a white man with a mulatto comes the cast of *quarterons*. When a female quarteron marries a European or creole, her son bears the name of *quinteron*. A new alliance with a white banishes to such a degree the remains of colour, that the children of a white and female quinteron are white also. The casts of Indian or African blood preserve the odour peculiar to the cutaneous transpiration of those two primitive races. The Peruvian Indians, who in the middle of the night distinguish the different races by their quick sense of smell, have formed three words to express the odour of the European, the Indian American, and the negro: they call the first *pezuña*, the second *posco* *, and the third *grajo*. Moreover, the mixtures, in which the colour of the children becomes deeper than that of their mother, are called *salta-atras*, or back-leaps.

In a country governed by whites, the families reputed to have the least mixture of negro or mulatto blood are also naturally the most honoured.

* Old word of the Qquichua language.

In Spain it is almost a title of nobility to descend neither from Jews nor Moors. In America, the greater or less degree of whiteness of skin decides the rank which man occupies in society. A white who rides barefooted on horseback thinks he belongs to the nobility of the country. Colour establishes even a certain equality among men, who, as is universally the case where civilization is either little advanced or in a retrograde state, take a particular pleasure in dwelling on the prerogatives of race and origin. When a common man disputes with one of the titled lords of the country, he is frequently heard to say, "Do you think me not so white as yourself?" This may serve to characterize the state and source of the actual aristocracy. It becomes, consequently, a very interesting business for the public vanity to estimate accurately the fractions of European blood which belong to the different casts. According to the principles sanctioned by usage, we have adopted the following proportions:

Casts.	Mixture of blood.	
Quarterons	$\frac{1}{4}$ negro	$\frac{3}{4}$ white
Quinterons	$\frac{1}{8}$ negro	$\frac{7}{8}$ white
Zambo	$\frac{3}{4}$ negro	$\frac{1}{4}$ white
Zambo prieto	$\frac{7}{8}$ negro	$\frac{1}{8}$ white

It often happens that families suspected of being of mixed blood demand from the high court

of justice *(l'audiencia)* to have it declared that they belong to the whites. These declarations are not always corroborated by the judgment of the senses. We see very swarthy mulattoes who have had the address to get themselves *whitened* (this is the vulgar expression). When the colour of the skin is too repugnant to the judgment demanded, the petitioner is contented with an expression somewhat problematical. The sentence then simply bears "that such or such individuals may consider themselves as whites *(que se tengan por blancos)*."

It would be interesting were we enabled to discuss thoroughly the influence of the diversity of casts in the proportion of the sexes to one another. I saw, from the enumeration in 1793, that in the city of Puebla and at Valladolid there were among the Indians more men than women, while among the Spaniards or the white race there were more women than men. The intendancies of Guanaxuato and Oaxaca exhibit in all the casts the same excess of men *. I never could procure sufficient

* This hardly makes in favour of John Rheinhold Forster's theory, embraced with so much ardour by the far-famed Mary Wollstonecroft in her Rights of Women, that the sex of the offspring is determined by the side on which the preponderance of ardour lies in the sexual intercourse. Hence, says she, 'there are more females than males in the east; for the females being deprived of their just share in that intercourse, have consequently a more than ordinary share of ardour. Yet

materials to resolve the problem of the diversity of sexes according to the difference of races, or according to the heat of the climate or elevation of the regions which our species inhabit:—We shall here, therefore, merely content ourselves with general results.

In France it has been found by a partial enumeration made with the greatest care, that in 991,829 souls, the living women are to the men in the proportion of nine to eight. M. Peuchet * appears to adopt the proportion of 34 : 33. It is certain that in France there are more women than men, and, what is very remarkable, that there are more males born in the country and in the south than in the towns and departments comprehended between the 47th and 52d degree of latitude.

But in New Spain these arithmetical calculations give a result totally different. The males are in general more numerous there than the females, as is proved by the following table, drawn up by me from eight provinces, or a population of 1,352,000 inhabitants.

here we see that these beardless Indians, who are cool enough in all conscience, and to whom their women prefer any thing that comes in their way, black or white, beget more males than females. *Trans.*

* *Statistique elementaire de la France*, p. 242.

Names of Intendancies and Governments.	Diversity of races.	Males.	Females.	Proportion of males to females.
Guanaxuato	Spaniards or whites	3[illegible],95[illegible]	49,31[illegible]	100 : 91
	Indians or indigenous	80,753	85,429	100 : 95
	Mixed casts	59,059	59,604	100 : 99
Valladolid de Mechoacan	Spaniards	40,[illegible]19	39,081	100 : 97
	Indians	61,352	58,016	100 : 94
	Mixed casts	44,701	43,704	100 : 98
Oaxaca	Spaniards	12,923	12,852	100 : 99
	Indians	182,[illegible]12	180,738	100 : 99
	Mixed casts	11,161	10,566	100 : 95
Durango	In these five provinces the total of all the races is merely given.	60,727	59,586	100 : 98
Sonora *		20,75[illegible]	17,832	100 : 87
Cinaloa		27,772	27,290	100 : 98
Nuevo Mexico		15,915	14,910	100 : 94
California		4,770	[illegible] 940	100 : 87
		957,935	904,[illegible]90	mean as 100 to 95
		1,354,835		

* It might be supposed that the excess of males in the north of Mexico is partly owing to the existence of the military posts called *presidios*, in which there are no women. But we shall

It follows from my calculations, compared with those made by the ministry of the interior at Paris, that the males are to the females in the general population of New Spain in the proportion of 100 : 95; and in the French empire in the proportion of 100 : 103. These numbers appear to indicate the true state of things; for we cannot conceive why, in the enumeration made by orders of the Count de Revillagigedo, the Mexican women should have more interest in withdrawing themselves than the men. This suspicion is so much the more improbable, as in the great cities the proportion between the sexes appears to differ from that in the country *.

afterwards see, that these presidios in the whole do not contain more than three thousand men.

* The Spanish missionaries tell us that among the Indians it is very common for a mother to kill her female offspring, from a wish to preserve her child from the misery which awaits her when grown up. (*Gumilla*, vol. II. p. 71.) Gumilla used to tax the women with their inhumanity in this respect, who, for answer, generally told him that they wished that they had themselves been deprived of life in childhood; and he gives, as he says, a faithful report of a speech made to him one day by one of these women, which occupies two or three pages. She enumerates the life of hardship which she had been obliged to lead, carrying her children about while working during the day and while her husband was amusing himself, and grinding his maize and preparing it for his breakfast during the night while he enjoyed himself in sleep. All this, she says, however, could even be borne with; but as she advances in years, the husband takes a young wife, who engrosses his af-

It is the aspect of these great cities which has probably given rise to the false idea generally prevailing in the colonies, that in warm climates, and consequently in all the lower regions of the torrid zone, more girls than boys are born. The few parish registers which I examined gave a directly contrary result. In the capital of Mexico there were born in five years between 1797 and 1802,

In the parishes of	Male births.	Female births.
the Sagrario .	3705	3603
of Santa Cruz .	1275	1167

At Panuco and Yguala, two places situated in a very warm and very unhealthy climate, there was not one register in which the excess was not on the side of the male births *. In general, the

fections, and to whom she and her children are obliged to become the slaves. The speech displays great feeling, and is no small credit to female Indian eloquence. (Id. p. 75-6-7.) This is the fate of the Indian women in the Spanish missions; it was once, no doubt, universal over the whole country; and though now, perhaps, somewhat milder among the *Indios reducidos*, yet a custom is often kept up long after the cause of it has ceased. We might account in this way for the smaller number of females than males among the Indians; and what appears to favour this view is, that in the great cities where the treatment of the females must be better from the influence of the whites, and consequently fewer female children will be murdered, the number of females exceeds that of the males. *Trans.*

* At Panuco, the parish registers give, from 1793 to 1802,

proportion of male to female births appears to me in New Spain to be as 100 : 97; which indicates an excess of males somewhat greater than in France, where for 100 boys there are born 96 girls *.

As to the proportion of the deaths to the difference of sexes, it was impossible for me to discover the law established by nature. At Panuco, in ten years, there died 479 males for 509 females. At Mexico, there were in one parish, that of the Sagrario, during five years, 2393 female deaths, and 1951 male. According to these data, very insufficient it must be allowed, the excess of men in life ought to be still greater than what it was found. But it appears that in other countries the male deaths are more frequent than the female deaths. At Yguala and Colimaya, the former were to the latter, for ten years, as 1204 : 1191 and 1330 : 1272. M. de Pomelles has already observed, that in France even, the difference of the sexes is much more sensible in the births than in the deaths; there are one-seventeenth more males than females

for 674 male births, 550 female births. At Yguala there were 1738 boys for 163 girls.

* I need not caution the reader that the proportion of male and female births is one thing, and that of males and females in existence another. For instance, M. de Humboldt has just told us, that the females are to the males in France as 103 : 100, though the female births are to the male as 96 : 100. *Trans.*

born, and the peaceful state of the country peasants gives only one-nineteenth more male than female deaths. From the whole of these data we may conclude that in Europe as well as the equinoxial regions, who have enjoyed a long state of tranquillity, we should find an excess of males, if the sea, the wars and dangerous employments peculiar to our sex did not tend incessantly to diminish their number.

The population of the great cities is by no means stable, and does not remain in a state of equilibrium with respect to the different sexes. The country women come in to the cities to serve in houses who want slaves; and a great number of men leave them to travel through the country as muleteers *(arrieros)*; or to fix their abode in places where there are considerable mines. Whatever be the cause of this disproportion of sexes in the cities, it is no less certain that such a disproportion exists. The following table, which includes only three cities, exhibits a striking contrast to the table which we gave of the general population of eight Mexican provinces:

Names of cities.	Diversity of races.	Males.	Females.	Proportion of males to females.
Mexico	Europeans*	2,118	217	100 : 10
	Spaniards or Creole whites	21,338	29,033	100 : 136
	Indians or indigenous	11,232	14,371	100 : 128
	Mulattoes	2,958	4,136	100 : 140
	Other casts or mixed races	7,832	11,525	100 : 147
Queretaro	Spaniards	2,207	2,929	100 : 133
	Indians	5,394	6,190	100 : 115
	Mixed casts	4,639	5,490	100 : 118
Valladolid	Spaniards	2,207	2,929	100 : 133
	Mulattoes	1,445	1,924	100 : 133
	Indians	2,419	2,276	100 : 93
		63,789	81,020	Medium 100 to 127
		144,809		

* This apparent disproportion proceeds from the small number of Spanish women who quit Europe for Mexico.

In the United States of North America the enumerations, which include the whole population, indicate, as in Europe* and Mexico, an excess of males in life. This excess is very unequal in a country where the emigration of whites, the introduction of many male slaves, and maritime commerce, tend incessantly to disturb the order prescribed by nature. In the states of Vermont †, Kentucky, and South Carolina, there are almost one-tenth more males than females, while in Pensylvania and the state of New York this disproportion does not amount to one-eighteenth.

When the kingdom of New Spain shall enjoy an administration favourable to knowledge, political arithmetic will there furnish data of infinite importance both for statistics in general, and for the physical history of man in particular. How many problems are to resolve in a mountainous country, which exhibits under the same latitude the greatest variety of climates, inhabitants of three or four primitive races, and the mixture of these races in all the combinations imaginable! How many researches to make regarding the age of puberty, the fecundity of the species, the difference of the sexes, and the longevity which is greater or less according to the elevation and temperature of the places, according to the variety of races, accord-

* Yet he has just stated, that in the French empire the females in life are to the males as 103 to 100! *Trans.*

† Samuel Blodget, p. 75.

ing to the epoch at which the colonists were transplanted into such or such a region, and, in short, according to the difference of food in provinces where the banana, the jatropha, rice, maize, wheat, and potatoes, grow together in a narrow space.

A traveller cannot give himself up to researches which require much time, the intervention of the supreme authority, and the concurrence of a great number of individuals interested in accomplishing the same end. It is sufficient here to have pointed out what remains to be done, when the government shall be disposed to profit by the happy position in which nature has placed this extraordinary country.

The operations of 1793, respecting the population of the capital, offer results which are deserving of a place at the end of this chapter. The individuals in this part of the enumeration, below and above the age of fifty, were distinguished according to the difference of cast; and it was found that this epoqua was passed:

By 4128 white creoles in a total population of 50,371

Individuals of the same race.

By 539 mulattoes	7,094
By 1789 Indians	25,603
By 1278 of mixed blood	19,357

So that there have past the age of 50:

In 100 white creoles (Spaniards)	8
Indians	6¾
Mulattoes	7
Individuals of other mixed casts	6

These calculations, while they confirm the admirable uniformity which reigns in all the laws of nature, seem to indicate that longevity is somewhat greater in the races which are best fed, and in which the epoqua of puberty is later. Of 2335 Europeans who were living in Mexico in 1793, not fewer than 442 had attained the age of fifty, which by no means proves that the Americans have three times less probability of attaining an advanced age than the Europeans; for the Europeans seldom remove to America till they have come to a mature age.

After examining the physical and moral state of the different casts of which the Mexican population is composed, the reader will no doubt desire to have a discussion of what is the influence of this mixture of races on the general wellbeing of society? and what is the degree of enjoyment and individual happiness, which, in the actual state of the country, a man of cultivated mind can procure amidst such a collision of interests, prejudices, and feelings?

We will not speak here of the advantages afforded by the Spanish colonies from the wealth of their natural productions, the fertility of their soil, the facility which a man possesses there of choosing as he feels inclined, with thermometer in hand, in a space of a few square leagues, the temperature or climate which he believes the most favourable to his age, his physical constitution, or the spe-

cies of cultivation to which he is most attached. We will not retrace the view of those delicious countries, situated half way up the ascent, in the region of oaks and pines, between 1,000 and 1,400 metres*, where a perpetual spring reigns, where the most delicious fruits of the Indies are cultivated beside those of Europe, and where these enjoyments are troubled neither by the multitude of insects, nor the fear of the yellow fever (*vomito*), nor the frequency of earthquakes. We will not discuss in this place if, without the tropics, there exists a region in which man, with less labour, can supply more abundantly the wants of a numerous family. The physical prosperity of the colonist does not alone modify his intellectual and moral existence.

When a European, who has enjoyed all that is most attractive in the social life of countries the farthest advanced in civilization, transports himself into these distant regions of the new continent, he feels oppressed at every step with the influence which the colonial government has for centuries exercised over the minds of the inhabitants. A well informed man, who merely interests himself in the intellectual developement of the species, suffers less perhaps than the man who is endowed with great sensibility. The former institutes a comparison with the mother country; from mari-

* 3,280 and 4,592 feet. *Trans.*

time communication he procures books and instruments; he sees with ecstacy the progress which the exact sciences have made in the great cities of Spanish America; and the contemplation of nature in all her grandeur, and the astonishing variety of her productions, indemnifies his mind for the privations to which his position condemns him. But the man of sensibility must seek in the Spanish colonies for every thing agreeable in life within himself alone. It is in this way that insolation and solitude have their attractions for him if he wishes to enjoy peaceably the advantages afforded by the excellence of the climate, the aspect of a never-fading verdure, and the political calm of the new world. While I freely give these ideas to the world, I am not censuring the moral character of the inhabitants of Mexico or Peru; nor do I say that the people of Lima are worse than those of Cadiz. I am rather inclined to believe, what many other travellers have observed before me, that the Americans are endowed by nature with a gentleness of manners rather approaching to effeminacy, as the energy of several European nations easily degenerates into harshness. The want of sociability so universal in the Spanish colonies, and the hatreds which divide the casts of greatest affinity, the effects of which shed a bitterness over the life of the colonists, are solely due to the political principles by which these regions have been governed since the sixteenth century.

A government, aware of the true interests of humanity, will be able to diffuse information and instruction, and by extinguishing gradually the monstrous inequality of rights and fortunes, will succeed in augmenting the physical prosperity of the colonists; but it will find immense difficulties to overcome before rendering the inhabitants sociable, and teaching them to consider themselves mutually in the light of fellow citizens.

Let us not forget that in the United States society is formed in a very different manner from what it is in Mexico and the other continental regions of the Spanish colonies. Penetrating into the Alleghany mountains, the Europeans found immense forests, in which a few tribes of hunters wandered up and down, attached by no tie to an uncultivated soil. At the approach of the new colonists, the natives gradually retired towards the western savannas in the neighbourhood of the Mississipi and the Missoury. In this manner free men of the same race and the same origin became the first elements of a new people. "In North America," says a celebrated statesman, "a traveller who sets out from a great town where the social state has attained to perfection, traverses successively all degrees of civilization and industry, which keep diminishing till he arrives in a few days at the rude and unseemly hut formed of the trunks of trees newly cut down. Such a journey is a sort of practical analysis of the origin of na-

tions and states. We set out from the most complicated union to arrive at the most simple elements; we travel in retrogression the history of the progress of the human mind; and we find in space what is due only to the succession of time*".

In New Spain and Peru, if we except the missions, the colonists nowhere returned to the state of nature. Fixing themselves in the midst of agricultural nations, who themselves lived under governments equally complicated and despotic, the Europeans took advantage of the preponderancy of their civilization, their cunning, and the authority they derived from the conquest. This particular situation, and the mixture of races of which the interests are diametrically opposite, became an inexhaustible source of hatred and disunion. In proportion as the descendants of the Europeans became more numerous than those sent over directly by the mother country, the white race divided into two parties, of which the ties of blood cannot heal the resentments. The colonial government from a mistaken policy wished to take advantage of these dissensions. The greater the colony, the greater the suspicion of the administration. According to the ideas which unfortunately have been adopted for ages, these distant regions are considered as tributary to Europe. Authority

* M. de Talleyrand in his Essay on Colonization.

is there distributed not in the manner which the public interest requires, but according as the dread of seeing a too rapid increase in the prosperity of the inhabitants seems to dictate. Seeking security in civil dissensions, in the balance of power, and in a complication of all the springs of the great political machine, the mother country foments incessantly the spirit of party and hatred among the casts and constituted authorities. From this state of things arises a rancour which disturbs the enjoyments of social life.

BOOK III.

PARTICULAR STATISTICAL ACCOUNT OF THE INTENDANCIES OF WHICH THE KINGDOM OF NEW SPAIN IS COMPOSED.—THEIR TERRITORIAL EXTENT AND POPULATION.

CHAPTER VIII.

Of the political division of the Mexican territory, and the proportion of the population of the intendancies to their territorial extent.—Principal cities.

Before giving the table which contains a particular statistical account of the intendancies of New Spain, we shall discuss the principles on which the new territorial divisions are founded These divisions are entirely unknown to the most modern geographers; and we here repeat what we have already stated in the introduction to this work, that our general map of New Spain is the only one which contains the limits of the intendancies established since 1776.

Mr. Pinkerton, in the second edition of his Modern Geography*, has endeavoured to give a

* It is this moment announced (Bibliotheque Americaine, 1808, No. 9,) that M. Pinkerton boasts of having availed

minute description of the Spanish possessions in North America; and he has contrived to mix several exact notions derived from the *Viajero Universal*, with the most vague data furnished by the dictionary of M. Alcedo. This author, who believes himself to possess a singular knowledge of the true territorial divisions of New Spain, considers the provinces of Sonora, Cinaloa, and la Pimeria, as parts of New Biscay. He divides what he calls the dominion (*domaine*) of Mexico into the districts of Neuva Galicia, Panuco, Zacatula, &c. &c. According to this principle we should

himself of my manuscripts for his work on Mexico. I communicated, with the frankness natural to me, several manuscript notes to M. Bourgoing, M. Alexander Laborde, and several other *savans* of equal respectability: I never communicated any thing to M. Pinkerton; and the manner in which he treated me in his Geography, before my return to Europe, was not calculated to produce an intimacy between us. A compiler as inaccurate as he is arrogant, M. Pinkerton, in the style which is peculiar to him, finds every thing which is repugnant to the ideas formed by him in his closet "ridiculous, disgusting, and absurd." Not knowing that the map of La Cruz is drawn up from that of Father Caulin, he will allow no other course to the rivers but what he finds indicated by the former. He pushes his scepticism so far, that if we would believe him, M. Depons, the author of the *Voyage a la Terre-Ferme*, does not even know the name of the country in which he lived for four years! The notes of the new edition of M. Pinkerton's Geography especially contribute to diffuse the most erroneous ideas in physics and descriptive natural history.

say that the three great divisions of Europe are Spain, Languedoc, Catalonia, and the territories of Cadiz and Bordeaux.

Before the introduction of the new administration by Count Don Jose de Galvez, minister of the Indies, New Spain contained, 1, El Reyno de Mexico; 2, El Reyno de Nueva Galicia; 3, El Nuevo Reyno de Leon; 4, la colonia del Nuevo Santander; 5, la provincia de Texas; 6, la provincia de Cohahuila; 7, la provincia de Nueva Biscaya; 8, la provincia de la Sonora; 9, la provincia de Nuevo Mexico; and 10, Ambas Californias, or las provincias de la vieja y Nueva California. These old divisions are still very frequently used in the country. The limits which separate la Nueva Galicia from el Reyno de Mexico, to which a part of the old kingdom of Mechoacan belongs, are also the line of demarcation between the jurisdiction of the two audiences of Mexico and Guadalaxara. This line, which I was not able to trace on my general map, does not exactly follow the contours of the new intendancies. It begins on the coast of the gulf of Mexico, ten leagues to the north of the Rio de Panuco and the city of Altamira near Bara Ciega, and runs through the intendancy of S. Luis Potosi to the mines of Potosi and Bernalejo; from thence passing along the southern extremity of the intendancy of Zacatecas, and the western limits of the intendancy of Guanaxuato, it traverses the intendancy

of Guadalaxara between Zapotlan and Sayula, between Ayotitlan and the Ciudad de la Purificacion, to Guatlan, one of the ports of the South Sea. All north of this line belongs to the audiencia of Guadalaxara; and all south of it to the audiencia of Mexico.

In its present state New Spain is divided into twelve intendancies, to which we must add three other districts, very remote from the capital, which have preserved the simple denomination of provinces. These fifteen divisions are,

I. UNDER THE TEMPERATE ZONE 82,000 leagues, with 677,000 souls, or eight inhabitants to the square league.

A. REGION OF THE NORTH, an interior region.

1. *Provincia de Nuevo Mexico*, along the Rio del Norte to the north of the parallel of 31°.

2. *Intendencia de Nueva Biscaya*, to the south-west of the Rio del Norte, on the central table-land which declines rapidly from Durango towards Chihuahua.

B. REGION OF THE NORTH-WEST, in the vicinity of the Great Ocean.

3. *Provincia de la Nueva California*, or north-west coast of North America possessed by the Spaniards.

4. *Provincia de la antigua California*. Its southern extremity enters the torrid zone.

5. *Intendencia de la Sonora*. The most

southern part of Cinaloa, in which the celebrated mines of Copala and Rosario are situated, also passes the tropic of Cancer.

C. REGION OF THE NORTH-EAST, adjoining the gulf of Mexico.

6. *Intendencia de San Luis Potosi.* It comprehends the provinces of Texas, la colonia de Nuevo Santander and Cohahuila, El Nuevo Reyno de Leon, and the districts of Charcas, Altamira, Catorce, and Ramos. These last districts compose the intendancy of San Luis properly so called. The southern part, which extends to the south of the Barra de Santander and the Real de Catorce, belongs to the torrid zone.

II. UNDER THE TORRID ZONE, 36,500 square leagues, with 5,160,000 souls, or 141 inhabitants to the square league.

D. CENTRAL REGION.

7. *Intendencia de Zacatecas*, excepting the part which extends to the north of the mines of Fresnillo.

8. *Intendencia de Guadalaxara.*

9. *Intendencia de Guanaxuato.*

10. *Intendencia de Valladolid.*

11. *Intendencia de Mexico.*

12. *Intendencia de la Puebla.*

13. *Intendencia de Vera Cruz.*

E. REGION OF THE SOUTH-WEST.

14. *Intendencia de Oaxaca.*
15. *Intendencia de Merida.*

The divisions in this table are founded on the physical state of the country. We see that nearly seven-eighths of the inhabitants live under the torrid zone. The population becomes thinner as we advance towards Durango and Chihuahua. In this respect New Spain bears a striking analogy to Hindostan, which in its north parts is bounded by regions almost uncultivated and uninhabited. Of five millions who inhabit the equinoxial part of Mexico, four-fifths live on the ridge of the Cordillera, or table-lands whose elevation above the level of the sea equals that of the passage of Mount Cenis.

New Spain, considering its provinces according to their commercial relations, or the situation of the coasts, is divided into three regions.

I. PROVINCES OF THE INTERIOR, which do not extend to the ocean.
1. *Nuevo Mexico.*
2. *Nueva Biscaya.*
3. *Zacatecas.*
4. *Guanaxuato.*

II. MARITIME PROVINCES *of the eastern coast* opposite to Europe:
5. *San Luis Potosi.*
6. *Vera Cruz.*
7. *Merida, or Yucatan.*

III. MARITIME PROVINCES *of the western coast* opposite to Asia.

8 *New California.*
9. *Old California.*
10. *Sonora.*
11. *Guadalaxara.*
12. *Valladolid.*
13. *Mexico.*
14. *Puebla.*
15. *Oaxaca.*

These divisions will one day possess great political interest, when the cultivation of Mexico shall be less concentrated on the central table-land or ridge of the cordillera, and when the coasts shall become more populous. The maritime provinces of the west will send their vessels to Nootka, to China, and the East Indies. The Sandwich islands, inhabited by a ferocious, but industrious and enterprising people, appear more likely destined to receive Mexican than European colonists. They afford an important stage to the nations who carry on commerce in the Great Ocean. The inhabitants of New Spain and Peru have never yet been able to profit by their advantageous position on a coast opposite Asia and New Holland. They do not even know the productions of the South Sea islands. The bread fruit tree and sugar-cane of Otaheite, that precious reed, the cultivation of which has had such a happy influence on West India commerce, will one day be received

by them from Jamaica, the Havanah, and Caraccas, and no longer from the more adjoining islands. What efforts have not been made by the United States of North America, within the last ten years, to open a communication with the western coast, with the same coast on which the Mexicans possess the finest ports, but without activity and without commerce.

According to the ancient division of the country, the *Reyno de Nueva Galicia* contained more than 14,000 square leagues, and nearly a million of inhabitants: it included the intendancies of Zacatecas and Guadalaxara*, as well as a small part of that of San Luis Potosi. The regions now known by the denomination of the seven intendancies of Guanaxuato, Valladolid or Mechoacan, Mexico, Puebla, Vera Cruz, Oaxaca, and Merida, formed, along with a small portion of the intendancy of San Luis Potosi†, the *Reyno de Mexico*, properly so called. This kingdom consequently contained more than 27,000 square leagues, and nearly four millions and a half of inhabitants.

Another division of New Spain, equally ancient and less vague, is that which distinguishes *New Spain, properly so called*, from the *provincias in-*

* With the exception of the most southern part, which contains the volcana of Colima and the village of Ayotitan.

† The most southern part through which the river of Panuco runs.

ternas. To the latter belongs all to the north and north-west of the kingdom of Nueva Galicia, with the exception of the two Californias; consequently, 1. the small kingdom of Leon; 2. the colony of New Santander; 3. Texas; 4. New Biscay; 5. Sonora; 6. Cohahuila; and 7. New Mexico. The *provincias internas del Vireynato*, which contain 7814 square leagues, are distinguished from the *provincias internas de la Comandancia* (of Chihuahua), erected into a capitania general in 1779, which contain 59,375 square leagues. Of the twelve new intendancies, three are situated in the provincias internas, Durango, Sonora, and San Luis Potosi. We must not, however, forget that the intendant of San Luis is only under the direct authority of the viceroy for Leon, Santander, and the districts near his residence, those of Charcas, Catorce, and Altamira. The governments of Cohahuila and Texas make also part of the intendancy of San Luis Potosi, but they belong directly to the comandancia general de Chihuahua. The following tables will throw some light on these very complicated territorial divisions. Let us divide all New Spain into

A. *Provincias sujetas al Virey de Nueva España;* 59,103 square leagues, with 547,790* souls: the ten intendancies of Mexico,

* This number ought to be 5,479,095. *Trans.*

Puebla, Vera Cruz, Oaxaca, Merida, Valladolid, Guadalaxara, Zacatecas, Guanaxuato, and San Luis Potosi (without including Cohahuila and Texas)

The two Californias.

B. *Provincias sujetas al comandante general de provincias internas*, 59,375 square leagues, with 359,200 inhabitants:

The two intendancies of Durango and Sonora;

The province of Nuevo Mexico;

Cohahuila and Texas.

The whole of New Spain, 118,478 square leagues, with 5,837,100 inhabitants.

These tables exhibit the surface of the provinces calculated in square leagues of 25 to the degree, according to the general map accompanying this work. The first calculations were made at Mexico in the end of 1803, by M. Oteyza and myself. My geographical labours having since that period attained to greater perfection, M. Oltmanns was so good as to recalculate the whole territorial surfaces. He executed this operation with the precision which characterizes whatever he undertakes, having formed squares of which the sides did not contain more than three minutes.

The population indicated in my tables is what may be supposed to have existed in 1803. I have explained in the 4th chapter (page 97. 110) the principles on which the changes were made in the

numbers obtained by the enumeration of 1793. I am aware that modern geographers admit only from two to three millions of inhabitants for Mexico. In all times the population of Asia has been exaggerated, and that of the Spanish possessions in America lowered. We forget that with a fine climate and fertile soil, population makes rapid advances even in countries the worst administered; and we also forget that men scattered over an immense territory suffer less from the imperfections of the social state than when the population is very concentrated.

We are uncertain as to the limits which ought to be assigned to New Spain to the north and east. It is not enough that a country has been run over by a missionary monk, or that a coast has been seen by a vessel of war, to consider it as belonging to the Spanish colonies of America. Cardinal Lorenzana printed at Mexico, even in 1770, that New Spain, through the bishopric of Durango, bordered perhaps on Tartary and Greenland * ! We are now too well instructed in geography to yield ourselves up to such vague suppositions. A viceroy of Mexico caused the American colonies of the Russians on the peninsula

* "*Y aun se ignora si la Nueva España por lo mas remoto de la diocesis de Durango confina con la Tartaria y Groelandia, por las Californias con la Tartaria, y por el Nuevo Mexico con la Groelandia.*" Lorenzana, p. 38.

of Alaska, to be visited from San Blas. The attention of the Mexican government was for a long time turned to the north-west coast, especially since the establishment at Nootka, which the court of Madrid was compelled to abandon to avoid a war with England. The inhabitants of the United States carry their civilization towards the Missoury. They gradually approach the coast of the Great Ocean, to which the fur trade invites them. The period approaches when, through the rapid progress of human cultivation, the boundaries of New Spain will join those of the Russian empire, and the great confederation of American republics. At present, however, the Mexican government extends no farther along the western coast than the mission of St. Francis, to the south of Cape Mendocin, and the village of Taos in New Mexico. The boundaries of the intendancy of San Luis Potosi on the east towards the state of Louisiana are not very well determined; the congress of Washington endeavour to confine them to the right bank of the Rio Bravo del Norte, while the Spaniards comprehend under the denomination of province of Texas, the savanas which extend to the Rio Mexicano or Mermentas, to the east of the Rio Sabina.

The following table exhibits the surface and population of the greatest political associations of Europe and Asia. It will furnish curious comparisons with the present state of Mexico.

Great political associations in 1808.	Square leagues of 25 to the degree.	Total population.	Inhabitants to the square league.
Russian empire	942,452	40,000,000	42
1. European part	215,809	36,400,000	169
2. Asiatic part	726,644	3,597,000	5
The single government of Irkutzk	350,000	680,600	2
The single government of Tobolsk	200,000	72,547	1
All Europe	476,111	182,599,000	383
The United States of North America, viz.			
1. With Louisiana	260,340	6,800,000	22
2. Without Louisiana*	156,240	6,715,000	43
3. Without Louisiana and the Indian territory (in Georgia and Western Waters)	78,120	6,655,000	85
Hindostan on this side (*en-deça*) the Ganges †	162,827		

* The calculations regarding America proceed on an erroneous estimation of the square mile. The territory without Louisiana amounts only to 117,478, and not 156,240 square leagues. See this explained in note, p. 278, by the translator. *Trans.*

† According to Arrowsmith's beautiful map of India, 1804. (Journal Astronomique de MM. Zach et Lindenau, 1807, p. 361.) The rest of the data from the classical work of M. Hassel, Statistical View of the States of Europe, No. I. (1805,) in German.

Great political associations in 1808.	Square leagues of 25 to the degree.	Total population.	Inhabitants to the square league.
English territory, of which the East India company possesses the sovereignty	48,299	23,806,000	493
Allies and tributaries of the English company	32,647	16,900,000	518
Turkish empire in Europe, Asia, and Africa	136,110	25,330,000	186
Austrian monarchy	33,258	25,588,000	769
France, according to M. Peuchet	32,000	35,000,000	1094
Spain, according to M. Laborde	25,147	10,409,000	413
New Spain,			
1. With the provincias internas	118,378	5,837,100	49
2. Without the provincias internas	51,289	5,413,900	105

We see from this table, which may suggest very curious considerations as to the disproportion of European cultivation, that New Spain is almost four times larger than the French empire, with a population which till this day is seven times smaller. The points of analogy in a comparison of the United States* with Mexico are very strik-

* The extent of territory of the United States is very difficult to estimate in square leagues, especially since the acquisition of Louisiana, the limits of which may be said to be very uncertain towards the west and north-west. According to M. Hutchins, the old geographer of the congress, and the author of the beautiful map of the countries situated beyond the Ohio, the United States contained in 1795 a surface of 640 millions of acres, or (discounting the lakes) 589 millions. Now 640 acres make a square mile; consequently (reducing in the proportion of 144 : 25) the 589 millions of acres are equivalent to 159,000 square leagues, of 25 to the degree. I have followed in the estimation of the territory in the preceding table the manuscript notes with which I was furnished by a respectable statesman, M. Gallatin, the American treasurer at Washington. According to these notes, the United States, without Louisiana, contain 900,000 *square miles*, or 156,240 square leagues. This number is less by one-ninth than what is generally adopted by the American geographers; but this difference proceeds from the more exact calculations of the surface of the lakes, and the more eastern position of the Mississipy, determined by the observations of M. Ellicot. M. Gallatin believes that the error of his estimation does not exceed 50,000 *square miles*. The half of these 156,240 square leagues belongs to the Indians, and can only be considered in the light of a country possessed by allies. I am of opinion that if we only include the regions

ing, especially if we consider Louisiana and the western territory as the *provincias internas* of the great confederation of American republics.

I have described the state of the provincias internas as it was when I left Mexico. A considerable change has since taken place in the military government of these vast provinces, of which the surface almost doubles that of the French empire. In 1807, two *commandantes generales*, brigadier generals (*brigadiers*) Don Nemesio Salcedo and Don Pedro Grimarest, governed these northern provinces. The following is the present division of the *Gobierno militar*, which is now no longer in the hands of the governor of Chihuahua alone:

in which the whites have already made establishments, and exclude those which are either desert or inhabited by Indians, the territory of the United States in place of 260,340 ought not to be estimated above 100 or 120,000 square leagues. *Author.*

The author is correct enough in the number of acres which he assigns to the square mile, but he errs in converting the square miles into square leagues. The proportion by which he reduces the square miles into leagues is 144 : 25, which is equal to 5.76 : 1. This proportion corresponds exactly to geographical miles of 60 to the degree. But the English square mile of 640 acres is not a square geographical mile, but a mile of 69.2 to the degree. Hence the proportion to the square league is not 5.76 : 1, but 7 663 : 1. The territory of the United States therefore does not amount to 156,240, but to 117,478 square leagues. *Trans.*

PROVINCIAS INTERNAS DEL REYNO DE NUEVA ESPAÑA.

A. *Provincias internas occidentales.*

1. Sonora.
2. Durango o Nueva Biscaya.
3. Nuevo Mexico.
4. Californias.

B. *Provincias internas orientales.*

1. Cohahuila.
2. Texas.
3. Colonia del Nuevo Santander.
4. Nuevo Reyno de Leon.

The new *commandantes generales* of the internal provinces, as well as the old, are considered as at the head of the administration of finances in the two intendancies of Sonora and Durango, in the province of Nuevo Mexico, and in that part of the intendancy of San Luis Potosi which comprehends Texas and Cohahuila. As to the small kingdom of Leon and New Santander, they are only subject to the commandant in a military point of view.

STATISTICAL ANALYSIS OF THE KINGDOM OF NEW SPAIN.

TERRITORIAL DIVISIONS.	Surface in square leagues of 25 to the degree.	Population reduced to the epoqua of 1803.	No. of inhabitants to the square league.
New Spain, (extent of the whole viceroyalty without including the kingdom of Guatimala.)	118,478	5,837,100	49
A. Provincias internas	67,189	423,200	6
a. Immediately subject to the viceroy, (provincias internas del Vereynato)	7,814	64,000	8
1. Nuevo Reyno de Leon	2,621	29,000	10
2. Nuevo Santander	5,193	38,000	7
b. Subject to the governor of Chihuahua (provincias internas de la comandancia general)	59,375	359,200	6
1. Intendencia de la Nueva Biscaya o Durango	16,873	159,700	10
2. Intendencia de la Sonora	19,143	121,400	6
3. Cohahuila	6,702	16,900	2
4. Texas	10,948	21,000	2
5. Nuevo Mexico	5,709	40,200	7

TERRITORIAL DIVISIONS.	Surface in square leagues of 25 to the degree.	Population reduced to the epoqua of 1803.	No. of inhabitants to the square leagues.
New Spain (extent of the whole viceroyalty without including the kingdom of Guatimala.)	118,478	5,837,100	49
B. New Spain, properly so called, immediately subject to the viceroy, comprehending los Reynos de Mexico, Mechoacan y Nueva Galicia, and the two Californias	51,289	5,413,900	105
1. Intendencia de Mexico	5,927	1,511,000	255
2. Intendencia de Puebla	2,696	813,300	301
3. Intendencia de Vera Cruz	4,141	156,000	38
4. Intendencia de Oaxaca	4,447	534,800	120
5. Intendencia de Merida, or Yucatan	5,977	465,800	81
6. Intendencia de Valladolid	3,446	476,400	273
7. Intendencia de Guadalaxara	9,612	630,500	66
8. Intendencia de Zacatecas	2,355	153,300	65
9. Intendencia de Guanaxuato	911	517,300	568
10. Intendencia de San Luis Potosi, (without including New Santander, Texas, Cohahuila, and the kingdom of Leon)	2,357	230,000	98
11. Old California, (Antigua California)	7,295	9,000	1
12. New California, (Nueva California)	2,125	15,600	7

This statistical table proves the imperfection of the territorial division. It appears that in confiding to intendants the administration of police and finances, the object was to divide the Mexican soil on principles analogous to those followed by the French government on the division of the kingdom into generalities. In New Spain every intendancy comprehends several *sub-delegations*. In the same manner the generalities in France were governed by sub-delegates, who exercised their functions under the orders of the intendant. But in the formation of the Mexican intendancies, little regard has been paid to the extent of territory or the greater or less degree of concentration of the population. This new division indeed took place at a time when the ministers of the colonies, the council of the Indies, and the viceroys, were unfurnished with the necessary materials for so important an undertaking. How is it possible to possess the detail of the administration of a country of which there has never been any map, and regarding which the most simple calculations of political arithmetic have never been attempted?

Comparing the extent of surface of the Mexican intendancies, we find several of them ten, twenty, even thirty times larger than others. The intendancy of San Luis Potosi, for example, is more extensive than all European Spain, while the intendancy of Guanaxuato does not exceed in size two or three of the departments of France. The fol-

lowing is an exact table of the extraordinary disproportion among the several Mexican intendancies in their territorial extent; we have arranged them in the order of their extent:

Intendancy of San Luis Potosi, 27,821 square leagues.
of Sonora, 19,143
of Durango, 16,873
of Guadalaxara, 9,612
of Merida, 5,977
of Mexico, 5,927
of Oaxaca, 4,447
of Vera Cruz, 4,141
of Valladolid, 3,447
of Puebla, 2,696
of Zacatecas, 2,355
of Guanaxuato, 911.

With the exception of the three intendancies of San Luis Potosi, Sonora, and Durango, of which each occupies more ground than the whole empire of Great Britain, the other intendancies contain a mean surface of three or four thousand square leagues. We may compare them for extent to the kingdom of Naples, or that of Bohemia. We can conceive that the less populous a country is, the less its administration requires small divisions. In France no department exceeds the extent of 550 square leagues: the mean extent of the departments is 300. But in European Russia and Mexico

the governments and intendancies are ten times more extensive.

In France, the heads of departments, the prefects, watch over the wants of a population which rarely exceeds 450,000 souls, and which on an average we may estimate at 300,000. The governments into which the Russian empire is divided, as well as the Mexican intendancies, comprehend, notwithstanding their very different states of civilization, a greater number of inhabitants. The following table will show the disproportion of population among the territorial divisions of New Spain. It begins with the most populous intendancy, and ends with the one most thinly inhabited.

Intendancy of Mexico, 1,511,800 inhabitants.
Puebla, 813,300
Guadalaxara, 630,500
Oaxaca, 534,800
Guanaxuato, 517,300
Valladolid, 476,400
Merida, 465,700
San Luis Potosi, 331,900
Durango, 159,700
Vera Cruz, 156,000
Zacatecas, 153,000
Sonora, 121,400

It is in comparing together the tables of the population of the twelve intendancies, and the ex-

tent of their surface, that we are particularly struck with the inequality of the distribution of the Mexican population, even in the most civilized part of the kingdom. The intendancy of Puebla, which in the second table occupies one of the first places, is almost at the end of the first table. Yet no principle ought more to guide those who chalk out territorial divisions than the proportion of the population to the extent expressed in square leagues or myriametres. It is only in states like France, which enjoy the inestimable felicity of a population almost uniformly spread over their surface, that divisions will admit any thing like equality of extent. A third table exhibits the state of the population, which may be called *relative*. To arrive at numerical results which indicate the proportion between the number of inhabitants and extent of inhabited soil, we must divide the absolute population by the territory of the intendancies. The following are the results of this operation:

Intendancy of Guanaxuato, 568 inhabitants to the square league.

Puebla, 301
Valladolid, 273
Mexico, 255
Oaxaca, 150
Merida, 81
Guadalaxara, 66
Zacatecas, 65

Vera Cruz, 38
San Luis Potosi, 12
Durango, 10
Sonora, 6.

This last table proves that in the intendancies where the cultivation of the soil has made least progress, the *relative* population is from 50 to 90 times less than in the old civilized regions adjacent to the capital. This extraordinary difference in the distribution of the population is also to be found in the north and north-east of Europe. In Lapland we scarcely find one inhabitant to the square league, while in other parts of Sweden, in Gothland, for example, there are more than 248. In the states subject to the King of Denmark, the island of Zealand contains 944, and Iceland eleven inhabitants to the square league. In European Russia, the governments of Archangel, Olonez, Kalouga, and Moscow, differ so much in their relative population to the extent of the territory, that the two former of these governments contain 6 and 26, and the two last 842 and 974 souls to the square league. These enormous differences indicate that one province is 160 times better inhabited than another.

In France, where the whole of the population gives 1094 inhabitants to the square league, the best peopled departments, those of *L'Escaut*, *Le Nord*, and *La Lys*, afford a relative population of

3869, 2786, and 2274. The worst peopled department, that of the *Hautes-Alpes*, composed of a part of old Dauphiny, contains only 471 inhabitants to the square league. Hence the extremes are in France in the relation of 8 : 1; so that the intendancy of Mexico, in which the population is the most concentrated, that of Guanaxuato, is scarcely so well inhabited as the worst peopled department of continental France *.

I flatter myself that the three tables which I have drawn up of the extent, absolute population, and relative population of the intendancies of New Spain, will sufficiently prove the great imperfection of the present territorial division. A country in which the population is dispersed over a vast extent requires that the provincial administration be restricted to smaller portions of ground than those of the Mexican intendancies. Whenever a population is under 100 inhabitants to the square league, the administration of an intendancy or a department should not extend over more than 100,000

* In these comparisons we have neither included the department of le Liamone, formed of the southern part of Corsica, and containing only 277 inhabitants to the square league, nor the department of the Seine. The latter, in appearance exhibits a relative population of 26,165 inhabitants. It would be useless to explain the causes which produce such an unnatural order of things, in a department of which the principal place is the capital of a great empire.

inhabitants. We may assign a double or triple number to regions in which the population is more concentrated.

It is on this concentration that the degree of industry, the activity of commerce, and the number of affairs consequently demanding the attention of government, undoubtedly depend. In this point of view the small intendancy of Guanaxuato gives more occupation to an administrator than the provinces of Texas, Cohahuila, and New Mexico, which are six times more extensive. But, on the other hand, how is it possible for an intendant of San Luis Potosi ever to know the wants of a province of 28,000 square leagues in extent? How can he, even while he devotes himself with the most patriotic zeal to the duties of his place, superintend the *sub-delegates*, and protect the Indian from the oppressions which are exercised in the villages?

This point of administrative organization cannot be too carefully discussed. A reforming government ought, before every other object, to set about changing the present limits of the intendancies. This political change ought to be founded on the exact knowledge of the physical state, and the state of cultivation of the provinces which constitute the kingdom of New Spain. France, in this point of view, exhibits an example of perfection worthy of imitation in the new world. The enlightened

men of which the constituent assembly was composed proved at their very outset what importance they attached to a good territorial division. This division can only be good when it rests on principles, which may be considered as so much the more wise as they are simple and natural.

END OF VOL. I.

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